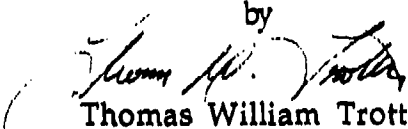


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THE FUTURE OF CARRIER AVIATION

by

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Additionally, this study addresses the variety of forces at work, which interact and impact upon the size and composition of the Navy's current and future carrier and air wing structure. Specifically, the Navy's two future strike aircraft programs, the AX and the FA-18 E/F, are investigated for their future application. Finally, a series of detailed recommendations are provided as measures to best preserve the future of carrier aviation.

EXECUTIVE SUMMARY

Over the last 45 years the United States Navy has generally maintained a fleet of 15 aircraft carriers and almost as many associated air wings. During this time frame, carrier air power was designed and funded with a strong Soviet maritime threat in mind, yet in reality, used against a myriad of third-world nations. With missions ranging from crisis response to sustained combat operations, aircraft carriers have continually been one of the United States most visible and flexible forms of forward-deployed military power.

Much like the other branches of defense, the Navy is in the process of scaling back its active forces. At the core of down-sizing is an active carrier force that will decrease from 15 to 12 deployable carriers. With fewer deployable carriers and a marked decrease in funding, the Navy has attempted to maintain an operational tempo similar to the past. Pursuit of "business as usual" has put into doubt the procurement of many future programs and the Navy's ability to fill the decks of 12 deployable carriers in the near future. With an end to the Cold War, a shift toward domestic affairs, and a perceived decrease in the threat to national security, it is an appropriate time to reassess the need for carrier aviation. This study will investigate future requirements for carrier aviation by critically evaluating: (1) the historical application of carrier air power across a broad spectrum of past scenarios, (2) carrier air power's applicability in light of the increased emphasis on regional threats, (3) variants of forward-defense in lieu of carrier air power to counter the changed threat, (4) future carrier aviation requirements, (5) historical and alternative modes of deployment for carriers.

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ABSTRACT

Over the last 45 years the United States Navy has generally maintained a fleet of 15 aircraft carriers and almost as many associated air wings. During this time frame, carrier air power was designed and funded with a strong Soviet maritime threat in mind, yet in reality, used against a myriad of third-world nations. With missions ranging from crisis response to sustained combat operations, aircraft carriers have continually been one of the United States most visible and flexible forms of forward-deployed military power.

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Additionally, this study addresses the variety of forces at work, which interact and impact upon the size and composition of the Navy's current and future carrier and air wing structure. Specifically, the Navy's two future carrier aircraft programs, the AX and FA-18 E/F, are investigated for their future application. Finally, a series of detailed recommendations are provided as positive measures to preserve certain aspects of carrier aviation.

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"THE FUTURE OF CARRIER AVIATION"

CHAPTER I

INTRODUCTION

As the United States Navy prepares for the next century, it will be vital to reevaluate its role in a world that has dramatically changed in the last two years. The demise of the former Soviet Union, the overwhelming success of United States military forces during the Gulf War, and the prospect of future declining budgets are the three prime events which suggest the need for an in-depth analysis of the way the military plans to do business in the near and far term. The Navy, like its sister services, can no longer legitimize a force structure centered around the theme of the old Soviet threat. Once a dangerous superpower now fragmented into a collection of new independent states, the former USSR's ability to conduct military operations has ebbed to a very low level.

The end of the Cold War has brought into question the future size and structure of the armed forces. Unfortunately for the Department of Defense (DoD), planning for defense spending is projected over a six-year period. Although all the services use long lead time in the acquisition of equipment, the Navy is particularly hampered since the time spent in research and development, contracting, construction and eventual fleet operations for ships and aircraft is often seven to ten years. Once procured, naval aircraft are often used in the fleet for approximately 10 to 20 years (dependant on aircraft type and rate of usage) and aircraft carriers between 40 and 50 years. Furthermore, economies of scale in the manufacture of defense products are only reached when a large number of weapons or systems are purchased. As

a result, the impact that smaller defense budgets will have on the acquisition process will be to drive up the price of future weapons systems. The decisions that are rendered today will affect future fleet structure for the next thirty to sixty years. A shrinking budget places extreme demands on long lead, high-priced projects such as aircraft carriers and their accompanying air wings. Not surprisingly, costly weapon systems are under close scrutiny, to ensure they are affordable and have future application.

THE DOLLAR DILEMMA

World events, coupled with a sagging American economy have heavily influenced the DoD planning system. The previous existence of a definitive threat against which adequate numbers of ships, armies and aircraft could be fiscally justified ensured a certain amount of built-in stability in past defense budgets. The absence of that same threat has thrown the DoD planning system into total disarray. Specifically, the budget deficit, which amounted to more than \$220 billion in 1990, spared cuts to DoD only by virtue of the Gulf War. A budget deficit of almost \$375 billion is projected in FY 1992, a figure far exceeding the current DoD budget. The Bush Administration predicts federal budget deficits to total \$1.5 trillion from 1992 through 1997. Undoubtedly, servicing interest on a debt of this magnitude has become a challenge in and of itself. The 1992 budget request for paying interest costs on the debt is \$206.3 billion. As it currently stands, interest on the national debt is the third largest budget item, behind only social security and defense.¹

¹ David E. Rosenbaum, "Budget as Bush Campaign Manifesto," The New York Times, 30 January 1992, pp. A1,14-15.

THE HISTORICAL SIDE OF BUDGETS

Historically characteristic of most periods following armed conflict, the national defense budget once again evidences a downward trend as indicated in Figure 1.

DEFENSE BUDGET AUTHORITY (Billions of '92 Dollars)

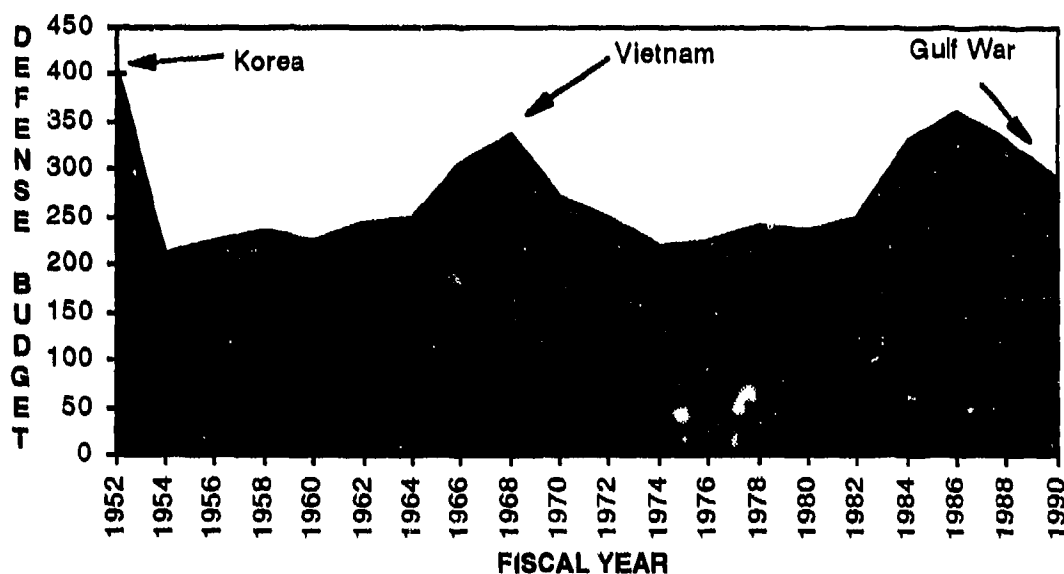


Figure 1.

Source: "Funding the Department of the Navy into the 21st Century: How Big is the Pie?," Center for Naval Analyses, Working Paper, 05-911153.09, Alexandria, VA: June 1991, p. 22.

Projected outlays contained in the Future Years Defense Plan (FYDP) point toward even less money for defense spending for a host of reasons, including, the diminishing security threat; demonstrated military efficiencies in the drubbing of Iraq; and, perhaps most importantly, the state of domestic affairs. Defense outlays as a share of the Gross National Product (GNP) have been in continual decline over the course of the last 40 years (Figure 2).

DEFENSE OUTLAYS AS A SHARE OF GNP

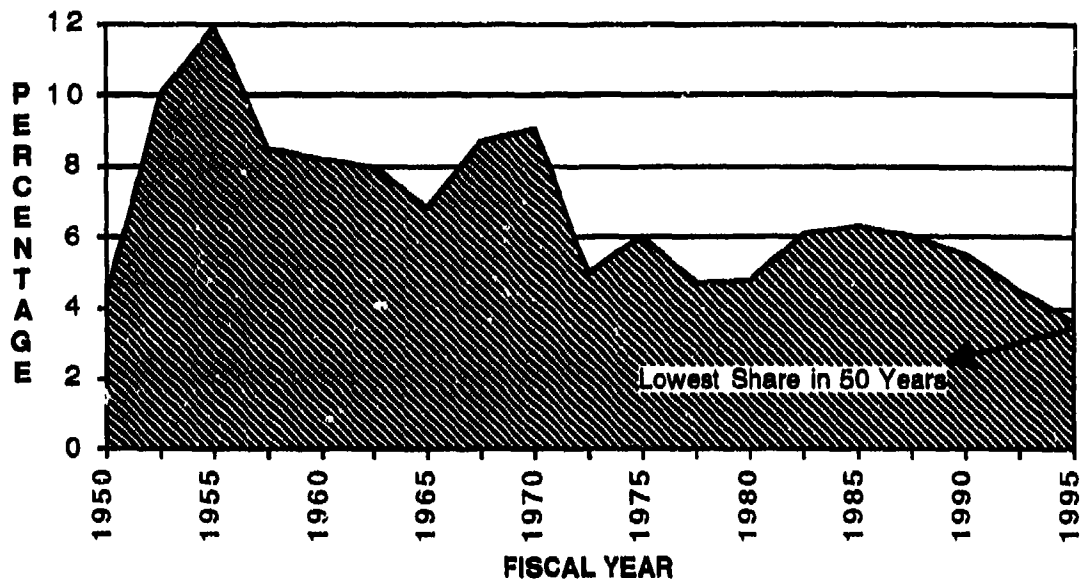


Figure 2.

Source: "Funding the Department of the Navy into the 21st Century: How Big is the Pie?," Center for Naval Analyses, Working Paper, 05 911153.09, Alexandria, VA: June 1991, p. 23.

Arguably, defense could be tied to GNP, resulting in a military that more closely follows growth trends within the economy. Such an approach, however, does not take into account a decreasing need for defense as security requirements change independent of GNP. Since the United States has never used such an approach, defense outlays are projected to be 4.7 percent of GNP for 1992 and 3.6 percent by FY 1996 which would rival the level of spending in 1938. In comparing defense to federal outlays in other areas, the same trend is evident. As Figure 3 on the following page illustrates,

DEFENSE AS A SHARE OF FEDERAL OUTLAYS

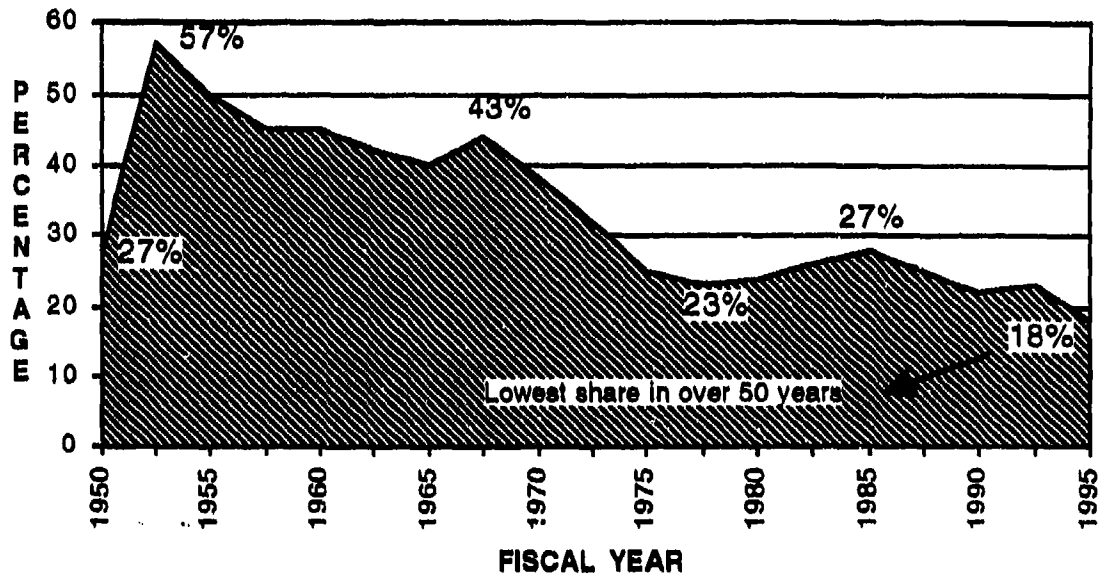


Figure 3.

Source: "Funding the Department of the Navy into the 21st Century: How Big is the Pie?," Center for Naval Analyses, Working Paper, 05 911153.09, Alexandria, VA: June 1991, p. 28.

defense spending as a percentage of total federal outlays is at its lowest level in 50 years with no expectation of change. If predicted downward trends in defense budgeting continue, the Navy will undoubtedly encounter difficulties in simultaneously funding a large fleet while attempting to continue modernization.

THE DYNAMICS OF DEFENSE PLANNING

In an effort to understand the dynamic nature of defense planning, it is worthwhile to examine the changing context of the security environment. As Figure 4 illustrates, the shift from the old Soviet paradigm to a new, multi-faceted threat environment has sparked debate over appropriate changes necessary in defense spending.

OLD	NEW
Bipolar Rigidity	Multipolar Complexity
Predictable	Uncertain
Communism	Nationalism/Religious Extremists
U.S. Dominant Western Power	U.S. Militarily no. 1, Not Economically
Fixed Alliances	Ad Hoc Coalitions
"Good Guys and Bad Guys"	"Grey Guys"
U.N. Paralyzed	U.N. Viable

Figure 4.

Source: Les Aspin, Chairman House Armed Services Committee, National Security in the 1990's: Defining a New Basis for US Military Forces, 6 January 1992, p. 12.

The Soviet backdrop to defense planning influenced all levels of decision-making in the formulation of both strategy and resource development for the last four decades. Deterrence had been the watchword and forces of containment were fielded to possibly fight a two-front global war against the USSR in both eastern Europe and the Pacific. The nuclear triad was at the core of the force structure and huge sums of money were expended on programs such as the B-1B bomber, the Trident submarine, and the MX Peacekeeper missile. As billions of dollars were poured into defense, the gap

between military strategy and the means by which it was accomplished began to narrow. During 1980s the American economy continued to grow beneath an umbrella of rising debt. On occasion, forward-deployed forces engaged third-world nations such as Syria, Libya, Iran and Panama with conventional forces in short skirmishes while concurrently keeping the forces of communism in check. A force structure designed to counter the Soviet threat was instead employed worldwide on short order as an extension of political reprisal against third-world figures whose behavior ran counter to that of the civil world.

As the 1980's credit came due in the early '90's, an inward focus on the American domestic agenda captured the nation's attention while communism crumbled in synchronization with burgeoning domestic unemployment and public disgust with recessionary signs of the times. With mounting domestic pressures, defense spending has come under new scrutiny. As Congressman Les Aspin commented,

"The old basis for size and shape of forces is gone. This means our next step is to assess the threats of the new era. The size and shape of our future forces must be based on the threats we expect to face. The right defense for the new era is a defense against those things that pose real threats. Today's military has been sized and shaped primarily by Cold War priorities, which no longer exist. A force structure that is merely smaller would still replicate an outdated structure. In the old world, there was only one thing that posed a threat. It was the Soviet Union. In the new world, there will be diverse threats."²

At what point do defense spending cuts hit bargain basement levels? Even though budget analysts would savor balancing the budget with DoD discretionary funds, the impact on the total deficit would be minimal. Approximately one-third of the DoD budget has historically been allocated to

² Les Aspin, Chairman House Armed Services Committee, National Security in the 1990's: Defining a New Basis for US Military Forces, 6 January 1992, p. 8.

the Department of the Navy.³ Taking into account long-range reductions already targeted for the defense budget (25% by 1995), the Navy can reasonably expect its one-third share to be a budget figure of roughly \$76 to \$81 billion dollars annually between 1993 and 1997. Whether cuts will stop at a reduction of 25 percent of the DoD budget is debatable. Some congressional insiders believe that cuts could approach 50 percent over the next 5 years with the distinct possibility of a total defense budget of \$150-\$175 billion by 1995. How willing the American public is to divert defense dollars to domestic concerns while relaxing previous national security standards is not yet predictable. Since there seems to be implicit agreement that DoD expenditures will be lower, emphasis must now shift to appropriate restructuring of the nation's defense.

Like the Army and the Air Force, the Navy must reformulate its maritime doctrine, weaponry, and priorities in the face of scarcer resources. At the heart of the Navy's force structure is the aircraft carrier. At a construction cost now exceeding \$4 billion dollars per vessel, aircraft carriers and their costly air wings are once again prime targets in an era of budget reduction. Carrier air power is logically compared and contrasted to other assets such as improved cruise missiles and high-technology stealth aircraft similar to the F-117 and B-2, that might accomplish the same power projection role. The future of carrier aviation will be determined through the ultimate resolution of the following fundamental issues:

- The mission and justification of carrier aviation as a tool of national defense.

³ Thomas P.M. Barnett and John D. Mayer, Funding the Department of the Navy into the 21st Century: How Big is the Pie? Center for Naval Analyses. Alexandria, VA: 13 June 1991, p. 26.

- The historical value of carrier aviation and its relevance, if any for the future.
- Competing alternatives to carrier air power.

If carrier aviation is justifiable, it must be further evaluated in the following areas:

- Application of carrier air power against current and future threats.
- Carrier air power's requirements in a changed fiscal and strategic environment.

Whether and how carrier air power fits into the new equation for national defense strategy is clearly at issue. The survival of carrier air power in this changed environment is directly dependent upon the value of its continued contribution in both peace time and in war.

CARRIER AVIATION'S STRATEGIC ROLES

The key role carrier aviation played in the defeat of the Japanese fleet in the Pacific during World War II brought about the transformation of the carrier as the centerpiece of deployable naval forces. Despite its successes, however, the Navy's command presence of 99 aircraft carriers in 1945 dwindled to a total of 15 by 1950.⁴ The dramatic decline in carriers resulted from the Truman administration's belief that the strategic capabilities of bombers and the advent of nuclear weapons had rendered carrier aviation obsolete. During the Korean war, the value of carrier air power enjoyed renewed recognition. In the years to follow, aircraft carriers grew in size and capability through the design of the *Forrestal*-class carrier followed shortly thereafter by the even larger nuclear-powered carrier *Enterprise*. Larger decks were required to accomodate longer catapults and modified arresting gear for launching and recovering a new generation of jet-powered aircraft that were

⁴ Robert L. Lawson, The History of US Naval Air Power (New York: The Military Press, 1987), p. 104.

both heavier and larger than previous models.⁵ Throughout the 1960's, attack carrier forces were maintained around 15 vessels, with an additional 7 Essex-class carriers serving in an anti-submarine warfare role as CVSS.⁶ During the 1980's, leadership within the Navy convincingly promoted the attributes of the big deck carrier (characteristic of *Nimitz*-class carriers), dwelling upon its importance in a potential conflict against the Soviet Union. Ironically, although the carrier was never used in direct armed conflict against Soviet forces, carrier aviation became the dominant military instrument of political retaliation against belligerent third-world nations. Military confrontations against Soviet client states such as Libya and Syria were conducted primarily by carriers, in many instances on short notice. Now that the prospect of global war has diminished, U.S. defense strategy is focused on more limited regional contingencies in different parts of the world where national interests are involved. How, then, does carrier aviation fit into the *new* equation of national defense strategy?

In late 1991 the Chairman of the Joint Chiefs, General Colin Powell, unveiled a new national military strategy reflecting the influence of dramatic world changes which had occurred over the preceding years. Its four basic tenets include strategic deterrence, reconstitution of forces, forward presence, and crisis response.⁷ The aircraft carrier has continually fulfilled the latter two roles over the last 40 years. Maintaining varying degrees of presence on the world's oceans, aircraft carriers have been a visible reminder of U.S. commitment to regional stability. A study conducted by the Center for Naval Analyses revealed that the Navy responded to a total of 207 political crises

⁵ Norman Friedman, *U.S. Aircraft Carriers*, (Annapolis, Maryland: Naval Institute Press, 1983), p.230.

⁶ *Ibid.*, 342.

⁷ Joint Chiefs of Staff, Draft National Military Strategy, (Washington: 8 October 1991) pp. 1-16.

between 1945 and 1990 (excluding Korea, Vietnam, and the Gulf War), with aircraft carrier involvement in 68 percent of the cases. In contrast, utilization rates of the Air Force and the Army during this same time frame were 25 and 18 percent respectively. Figure 5 is a comparison of crisis responses involving carrier air power against all military responses between 1955 and 1975.

COMPARISON OF RESPONSES INVOLVING CARRIERS AND ALL RESPONSES

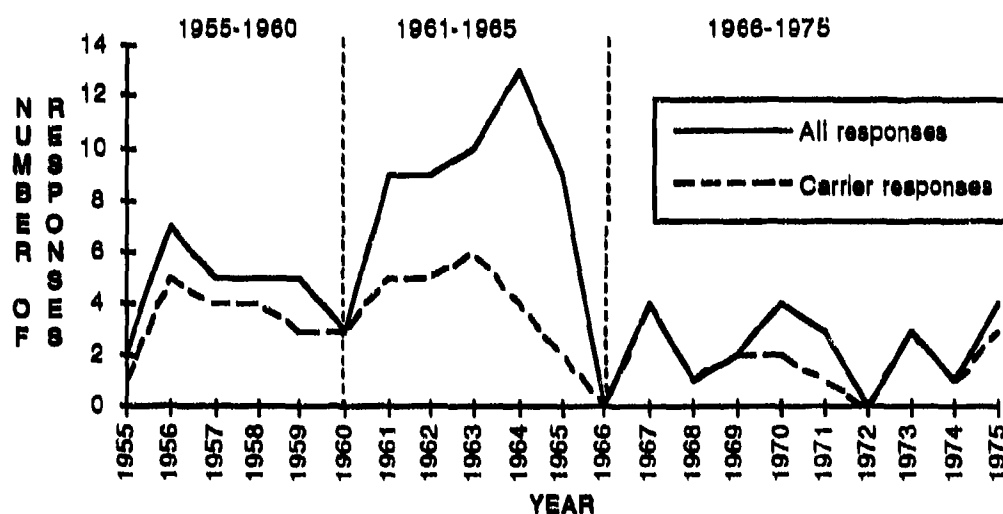


Figure 5.

Source: Mahoney, Robert, "U.S. Navy Responses to International Incidents and Crises, 1955-1975, Survey of Navy Crisis Operations," Center for Naval Analyses, CRC 322 Vol. I, July 1977, p. 21.

CHANGES FOR THE FUTURE AND THEIR IMPACT ON STRATEGY

Perhaps the only aspect of the new world order that has not changed is geography. For ships transiting the vast distances of the western Pacific enroute to the Indian Ocean, it may very well seem as though the distance has increased, absent the convenience of the former stopping point in the Philippines for ship repairs and materiel. Fewer overseas bases for all

branches of defense presents a greater challenge to deployment of personnel and equipment to the far corners of the world. It is highly likely that the U.S. will face increasing limitations on access to foreign ports and military installations as nationalism and instability influence those nations' willingness to grant entry on even an occasional basis. Naval forces steaming independently over greater distances could possibly become a norm for deployment, making nuclear-powered vessels, such as the *Nimitz*-class carrier much more attractive alternatives than conventionally-powered ships which require constant refueling underway.

Since most modern nations engage in foreign military sales, the proliferation of modern military technology and equipment is nearly impossible to contain. A prime example is the alleged receipt of tactical nuclear weapons by Iran from the new Commonwealth of Independent States. With the breakup of the Soviet Union and Eastern Bloc nations, the migration of technicians and engineers will undoubtedly result in the attainment of complex weaponry for even the less affluent developing nations of the world. Weapons that were once considered high-technology equipment such as air-to-surface cruise missiles launched from supersonic aircraft or ballistic surface-to-surface Frog or Scud missiles will become standard equipment for many nations (see Figure 6).

WEAPONS PROLIFERATION

Third-World Nations with ASCMs



Figure 6.

Source: ACNO AIR WARFARE (OP-05), America's Carrier Battle Groups: Lasting requirements in a Period of Global Change.

The increasing sophistication of armament among adversarial third-world nations, necessitates the advancement of U.S. weaponry in terms of research, development and modernization even in times of stringent budget times in an effort to stay ahead of potential security threats.

In an era dominated by regionalism, nations are more likely than in recent times to shift alliances to meet their own needs. The diminished bipolar world alignment with either the former Soviet Union or United States permits nations the option of independence or alignment with partners of convenience to resolve regional or national concerns. Changing world power relationships include new tensions and new risks which may influence alignment choices of existing U.S. allies. Issues such as overflight or permanent U.S. presence will be regarded as options rather than obligations arising out of formal alliances. Acceptance or rejection of such options will take into account the views of client states or adversarial regional neighbors. Such implications were most likely in the minds of the French

leadership in 1986 when U.S. Air Force strike aircraft were denied overflight of France, which would have considerably shortened the distance required to be flown to conduct, from England, a strike on Libya, a country which has always been a major purchaser of French arms. Furthermore, reliance on foreign bases as either a transit point in the movement of personnel and materiel or as a forward base from which to operate is becoming a restricted option as alliance relations change and American forces are withdrawn from overseas bases. In the face of this reality, the U.S. Navy will likely be the force of choice *if* a strategy of forward presence is preserved to reinforce regional stability.

CHAPTER II

CARRIER AVIATION, A HISTORICAL PERSPECTIVE

A brief look at a variety of cases since the Korean War is useful to promote a better understanding of how the United States has employed the Navy's carrier air power arm. The following specific cases vary in duration, scope of involvement, force mix and ultimate success or failure. For purposes of comparison, the application of carrier air power has been organized into four general categories:

- A. CARRIER ONLY: Carrier air power only.
- B. CARRIER PLUS: Primarily carrier air power augmented by other services.
- C. CARRIER JOINT: Carrier air power as a part of joint operations.
- D. CARRIER SUPPLEMENT: Carrier air power as a supplement to other air forces that were forward based and utilized in mass.

A. CARRIER ONLY - Exclusively carrier air power:

• *Achille Lauro*: Following the hijacking of the Italian cruise ship *Achille Lauro* on 7 October 1985 and the murder of an American citizen aboard the ship, the perpetrators of the hijacking commandeered an Egyptian airliner from Cairo for their escape. The carrier *Saratoga*, operating in the nearby Adriatic Sea, was tasked by the National Command Authority (NCA) to intercept the airliner and force it to land at the Naval Air Station in Sigonella, Sicily. The mission was successful; the airliner was forced to land and the hijackers were subsequently turned over to Italian authorities.

The fact that the *Saratoga* was on the scene and in a position to accomplish such a mission on short notice graphically demonstrated the responsiveness of carrier air power in a forward deployed status during a

limited crisis scenario. Non-carrier-based tactical aircraft would have encountered tremendous difficulty in accomplishing the same scenario since the short-fused nature of the situation would have drastically curtailed the time required for mission planning, coordination of aerial refueling, and interception of the airliner by U.S. fighters flying from a European base.

• **Strike into Lebanon 1983:** On 23 October 1983, the U.S. Marine Corps barracks in Lebanon was leveled, resulting in massive loss of life, when a terrorist truck bomb was driven into the headquarters compound. The following month the naval member of the joint U.S. military assistance group in Athens, Greece was assassinated by a terrorist. On 3 December 1983, Navy F-14 reconnaissance aircraft were fired upon by Syrian missiles and anti-aircraft batteries from sites surrounding Beirut. The National Command Authority decided to launch a retaliatory strike against the Syrian missile sites. A 28 plane raid consisting of 12 A-7E's and 16 A-6E's from the carriers *Independence* and *John F. Kennedy* was launched on the morning of 4 December to attack Syrian positions in the Shuf and Metn mountains east of Beirut. As expected, the Syrians were waiting and released a barrage of missiles and anti-aircraft artillery. An A-6E was shot down, killing the pilot. The second crew member was captured. Additionally, two A-7E's were shot down, one crashing in Lebanon and another off its coast. The mission was touted as "very successful" by the Department of Defense, citing destruction of one Surface-to-Air Missile (SAM) site and striking of 11 other point targets.⁸ In actuality, the loss of 3 multi-million dollar attack aircraft in a single raid could be described more realistically as a disaster when, during the Gulf War seven years later, a total of 6 Navy aircraft were lost in 16,899 combat sorties

⁸ "Naval Review 1984," U.S. Naval Institute Proceedings, May 1984 pp. 59-61.

flown against very similar if not more advanced surface-to-air defenses.⁹ Although tactics and suppression of enemy air defenses have come a long way, the concept of losing a pilot, with a second crewman captured and several aircraft destroyed in exchange for destroying some "point targets" and a SAM site all point toward failure. The short order nature of the strike made the use of carrier air a logical choice for the NCA. In retrospect however, when weighing the outcome against the political and military gain, the use of *any* type of tactical air against an enemy that was so well fortified and dispersed was not a prudent choice given the risk involved. The subsequent shelling of the same type of fortifications by the battleship *New Jersey* was nearly as ineffective as the tactical aircraft yet at a much lower cost.

The Lebanon raid demonstrated that although carrier air power is readily available in many regional hot spots, its application, like any other form of military force, must be carefully measured against the threat and the risk involved. In this case, the adversary's defenses were well prepared and the target not so unique or valuable that the loss of life was worth the risk. The political interests that prompted the strike were not adequately assessed against the probability of military success.

B. CV PLUS - Primarily carrier air power augmented by other services:

•Persian Gulf Operations 1987-88 (Escort Operations):

During 1987, the scope and intensity of naval operations in the North Arabian Sea and Persian Gulf exceeded any since the Vietnam conflict. As the number of attacks against merchant shipping by both Iran and Iraq increased in 1987 during the Iran-Iraq War, the decision was made to reflag and escort a

⁹ Steve Froggett, "Tomahawk In the Desert," U.S. Naval Institute Proceedings, January 1992, p. 72.

number of Kuwaiti tankers. On 14 April 1988, the *Samuel B. Roberts*, a guided missile frigate, struck an Iranian mine in the central Persian Gulf. At this time, American forces in the area included minesweepers, Army attack helicopters, a carrier battle group, SEALs, and a contingency Marine Air-Ground Task Force (MAGTF). On 18 April, a retaliatory attack was launched against two Iranian oil drilling platforms and a day-long naval battle ensued in which a major Iranian combatant, the frigate *Sahand*, was sunk and a second frigate left totally disabled as a result of attacks by aircraft from the carrier *Enterprise* (CVN-65). Since the *Enterprise* was stationed outside the Straits of Hormuz, in the North Arabian Sea, as opposed to in the more restricted waters of the Persian Gulf, Air Force KC-10 tankers were used to refuel carrier aircraft over the Straits of Hormuz enroute to the area of engagement.¹⁰ The plan, code named "Praying Mantis," was received during the evening of 17 April and executed early the following morning. In August of 1988, a U.N.-sponsored cease-fire went into effect, ending the eight-year long Iran-Iraq war.¹¹

Arguably, Air Force tactical air assets could have been used to accomplish the same mission in the absence of an aircraft carrier. The need to place American tactical aircraft in a nearby host nation would have presented an extremely unpallatable political position for a contingency of this nature since a war was already in progress between Iran and Iraq. A base such as Diego Garcia could have been used but the necessity for a complex strategic tanking plan to arrive at the scene of the operation nearly 2,500 miles away would have presented an extreme challenge. Moreover, the timing of the

¹⁰ Bud Langston and Don Bringle, "Operation Praying Mantis," U.S. Naval Institute Proceedings, May 1989, pp. 54-60.

¹¹ Adam Siegel, The Use of Naval Forces in the Post-War Era: U.S. Navy and U.S. Marine Corps Crisis Response Activity, 1946-1990, CRM 90-246 Alexandria, VA: February 1991, p. 49.

attack would have been difficult to predict since the Iranian Navy transited short distances to and from the area of eventual engagement over the course of very short periods of time. Intelligence communications with naval vessels in the area concerning the whereabouts of Iranian ships would have been stretched over the vast expanses of the Indian Ocean.

Likewise, tasking cruisers and destroyers in the area with the naval engagement in the absence of airpower, would have presented a multitude of challenges. The Iranians used high-speed boats called Boghammers in attacking ships. The small, maneuverable Boghammer can easily outrun any naval vessel with the exception of a hydrofoil. The Boghammers were attacked and neutralized by carrier-based A-6E aircraft. During the carrier air attack on the frigates, F-14 Tomcats set up barrier combat air patrols to discourage the intervention of Iranian fighters from airfields close by. Upon receipt of intelligence that Iranian vessels were getting underway from the Iranian port of Bandar Abbas, strike aircraft were launched to search out and eventually find the vessels. The search and identification phase of intercepting the Iranian warships would have been an extreme challenge for a surface vessel that was not in an appropriate position for interception since transit distances were so short from the Iranian ports to the zone of conflict. The success of operation "Praying Mantis" was primarily due to the responsive, versatile and lethal striking power strategically positioned in the North Arabian Sea. E-2C airborne early warning, took up both aerial and surface surveillance of the region while EA-6B Prowler aircraft electronically jammed Iranian support and information systems. Simultaneously, F-14 Tomcat fighters took up barrier patrol positions to counter any possible airborne tactical aircraft while airborne surface surveillance was being conducted by a variety of air wing assets. This unique packaging of carrier air

wing assets made possible the rapid interception and destruction of belligerent naval forces in an environment in which the opposition might have otherwise mustered together a significant tactical air threat to oppose the ensuing naval battle.

•**Grenada 1983:** In 1974 the island Grenada began its shift toward communism and the Soviet sphere of influence. Grenada became an ideal site for a Cuban/Soviet military base with its strategic position that could potentially interrupt the flow of trade to the U.S. from the Caribbean into the Atlantic. Cuban military personnel arrived between 1980-1982 to assist in the construction of a major airport complex at Point Salines. It was only after the assassination of former Prime Minister Maurice Bishop that the political turmoil escalated and prompted a response from Washington, concerned for more than 600 American medical students, tourists and retirees on the island. On 19 October 1983, a non-combatant evacuation operation was developed by the Commander-in-Chief Atlantic (CINCLANT).¹²

On 22 October the NCA decided to invade Grenada. Commander Joint Task Force 120 (CJTF 120) was formed for the purpose of conducting military operations to protect and evacuate U.S. and designated foreign nationals from Grenada. Barely 40 hours passed from the time of assignment of Vice Admiral Joseph Metcalf as CJTF 120 mission commander to commencement of operations.¹³ Having departed Norfolk, Virginia enroute to the Mediterranean, the carrier *Independence* was diverted to the Caribbean as part of the force that was assembling for the rescue of Americans from the island of Grenada.

¹² Stephen Harding, *Air War Grenada*, (Missoula Montana: Pictorial Histories Publishing 1984), p. 9.

¹³ Joseph Metcalf III, "Decision Making and the Grenada Rescue Operation" (Reprint Work: US Naval War College NWC 4195), p. 278.

On the morning of the invasion, the *Independence* launched strikes on the People's Revolutionary Army (PRA) and Cuban forces with repeated attacks by A-6E and A-7E strike aircraft. Additional air strikes were called in against Anti-Aircraft Artillery (AAA) sites the same day. For the next two days, Navy attack aircraft were called in as needed to suppress enemy fire and strike known enemy positions. By the fourth day, the operation was complete and the *Independence* proceeded on to the Mediterranean. In order to provide strike aircraft for any contingency that might arise, A-10 aircraft were moved from England AFB in Louisiana to Barbados.

Could the Grenada operation have been accomplished as efficiently without carrier aircraft? Certainly, greater demands would have been placed on the C-130 Spectre gunships, and use of Air Force tactical aircraft would have required inflight refueling enroute from a host country such as Barbados. The quality of on-call close air support would have been adversely impacted by the refueling requirements of the aircraft involved and further complicated by the need to return to a distant land base. The proximity of the carrier to the island allowed the rapid recovery and availability of tactical aircraft for close air support missions. Moreover, the *Independence* and her air wing provided more than just close air support. Although Cuban submarines never sortied as potential adversaries, carrier-based anti-submarine (ASW) aircraft continually patrolled the surrounding waters for Cuban submarines possibly entering the area. Helicopter assets were also used for ASW purposes in addition to search and rescue. Once again, the self-contained "come-as-you-are, ready-to-fight" capability of the carrier provided the flexibility and necessary aircraft for rapid crisis response. Air Force assets could have certainly performed the same air support missions, yet the rapid arrival of the *Independence* and her air wing obviated the requirement for Air

Force tactical air that would have been employed at a much greater distance from the scene of this limited military operation.

C. CV JOINT - Carrier air power as a part of joint operations:

•**Jordan 1970:** As a method of "signaling" U.S. intentions, ships of the Sixth Fleet were used in 1970 when Syrian troops made incursions into Jordan. Much of the decision to place Army, Air Force, and Naval forces into an alert status was couched in Washington's resolve to demonstrate U.S. determination in the face of Soviet intervention. The overriding concern of the U.S. during the crisis was to ensure that King Hussein would remain in power if fighting broke out between Jordan and Syria. Throughout the crisis, the U.S. "signaled" various roles its military would play in assisting Jordan. The press reported the rendezvous of the carriers *Saratoga* and *Independence* near Cyprus in the eastern Mediterranean. On 18 September a third carrier, the *John F. Kennedy* was ordered to proceed from the Atlantic to the Mediterranean. The usual Sixth Fleet contingent of a two-carrier presence increased to a total of three, indicated the seriousness of the situation. As Syrian troops moved into Jordan on 19 September, the carrier task group was moved further east toward Syria. The announcement that the *Kennedy* was heading toward the Mediterranean was made on 21 September along with sending an aircraft from the sixth fleet to Tel Aviv, Israel ostensibly to coordinate strike planning against Syria. Already a formidable threat, the striking power of the carriers was tremendously enhanced by Israeli air power support. Once reassured of U.S.-Israeli assistance, the Jordanian Air Force

was committed on 22 September and the following morning the Syrian army began withdrawal.¹⁴

The resolution of the Jordanian crisis in 1970 is a classic example of diplomacy combined with military force yielding a solution to a complex problem without actually resorting to armed conflict. Although continual carrier presence in the Mediterranean has not necessarily deterred crisis development, it can be viewed as an essential ingredient to the overall formula for crisis resolution such as the Jordanian conflict. In this case, Jordan chose to resolve an internal problem independently, once guaranteed that assistance would be rendered if needed. Arguably, surface combatants could have been moved in a manner that carriers were in this case. The "signalling" effect would have lacked substance when the option of serving as an enabling force alongside the Israeli Air Force was proposed as an option. Moreover, placing Air Force tactical aircraft on Israeli soil for the purpose of striking Syria would be politically unpalatable. Carrier-based aircraft have greater freedom to operate in international waters which, in this and similar cases, makes them an attractive option.

• **Korean War 1950:** On 25 July 1950 the North Korean People's Army invaded South Korea. Nine days later the United States Navy commenced what would become three years of intensive carrier operations against North Korea. For the Navy, the war began with one carrier, the *Valley Forge*, and eventually increased in strength to a fleet of six carriers (one British), for the amphibious landing at Inchon. John Winton described the developing Korean scenario:

¹⁴ Barry M. Blechman and Stephen S. Kaplan, Force Without War, (Washington, DC: The Brookings Institution, 1978), pp. 222-288.

"It became evident early in the war that sea power was the only way of holding the ring in Korea, to bring in reinforcements and supplies for the beleaguered Eighth Army which was being compressed into a restricted defensive perimeter extending only a few miles around the southern port of Pusan. As the Army continued to fall back, the carriers received more and more urgent calls for close air support."¹⁵

Although General MacArthur's classic reinsertion of forces at Inchon is revered as a masterful strategic maneuver, aircraft carriers played a significant role in the success of the amphibious assault. After Allied land forces had almost been shoved off the bottom of the Korean peninsula by advancing North Korean troops, the risky attempt to launch an amphibious assault at Inchon on the northwest side of South Korea was a last-ditch effort to cut the vital North Korean lines of communication and reestablish an Allied foothold. For two days, the aircraft carriers *Valley Forge* and *Philippine Sea* were assigned the job of "softening up" the area surrounding Inchon where the landing was to take place. On the morning of the September 15 landing, all six carriers fulfilled an air support role as troops began the all-important amphibious landing at Inchon. Within two days American troops had captured Inchon and Kimpo Airfield. By late September the tide of the war had turned, and once again Allied forces were on the offensive.

The Korean War re-emphasized the need for carrier air power. At the beginning of the war, planes operating from bases in Japan could stay over targets in Korea for no more than 15 to 20 minutes, hampered by distance and fuel limitations. As a result, fighter and attack aircraft from carriers performed much of the bombing campaign along with essential support of land operations. When the tide of the war shifted, land-based air again resumed primary support of land operations. The Korean War effort relied

¹⁵ John Winton, Air Power at Sea (New York, New York: Carroll & Graf Publishers, Inc, 1987) p. 21.

heavily upon the delivery of troops and supplies from the sea. As part of the war effort, the aircraft carrier *Boxer* arrived from the United States on 23 July 1950 with 145 P-51 Mustang fighters for the Far Eastern Air Force after having steamed across the Pacific in only 8 days.¹⁶

During the Korean war, a total of 17 American carriers operated with an average of 400 embarked combat aircraft flying more than 250,000 missions.¹⁷ Carrier air power contributed a third of all the air operations in Korea. Interestingly enough, before the Korean war a great deal of debate raged over the future need of aircraft carriers. Afterward, the debate had not only ceased, but the acquisition process to field new, larger carriers was underway.

Even from a cursory examination of the Korean War and the role carrier aviation played, it is evident that a different outcome might have resulted had sea-based air power not been available. In several instances during the Korean War, carrier air power was the *only* option for infantry support and was a vital component in the landing at Inchon. Lack of carrier air power in Korea would have spelled certain disaster as North Korea nearly overran Allied forces in South Korea. The notion that forward bases will always be available in a region where forces are forward deployed is not necessarily a prerequisite that can always be counted on.

• **Libyan Operations 1986 - "El Dorado Canyon:"** In December of 1985, civilian massacres occurred in both the Rome and Vienna airports which were later linked to Libyan perpetrators. Libyan agents were also implicated in the April 1986 bombing of a Berlin discotheque where several American servicemen were among those killed. In retaliation for Libya's persistent

¹⁶ Ibid., 21.

¹⁷ Ibid., 57.

terrorist campaign, plans were formulated for a joint operation between Air Force F-111 bombers based in England and strike aircraft from the carriers *Coral Sea* and *America*. The plan assigned Air Force assets to attack targets in Tripoli while the carrier *America's* aircraft hit downtown Benghazi targets and *Coral Sea* aircraft attacked targets at the Benina airfield. Jet fighters from the *America* provided cover against Libyan Migs while *Coral Sea* aircraft provided the vast majority of suppression against enemy air defenses by way of High Speed Anti-Radiation Missiles (HARM) which up to this point had not been combat-tested. Airborne early warning was provided by E-2C Hawkeye aircraft based on both ships.¹⁸ Because of the proximity to the Libyan coast at launch time, the Navy strike and strike support aircraft had a considerably shorter distance (250 nm to 300 nm) to fly each way to the target than the Air Force F-111's which were denied overflight of both Spain and France, resulting in a mission of over 3,000 nm each way. Inflight refueling that involved numerous tankers emphasized the tremendous capability of tankers to accomplish such long-range missions, but lengthened the Air Force's mission by flying tactical aircraft over such vast distances. Overall, the Libyan mission was risky, but an operational success. The loss of a single F-111 aircraft and its crew was unfortunate, yet not excessive considering the total number of aircraft involved. Although the military effectiveness of the mission was questioned when damage assessment was completed, the reduction in Libyan terrorism for some years following the strike would suggest achievement of a moral victory.

Could the same mission have been accomplished with Air Force land-based assets alone? Perhaps, but to do so would have considerably heightened

¹⁸ Robert E. Stumpf, "Air War with Libya," U.S. Naval Institute Proceedings, August 1986, pp. 42-48.

the risk in attempting to move so many Air Force assets to a limited region covertly. The same number of strike and support aircraft may have been detected due solely to the number of aircraft involved. Moreover, the Navy possesses great depth in terms of aircraft used for suppression of enemy air defenses as was demonstrated the night of the Libyan strike. Even though Libyan fighters did not launch on the night of the strike, covering the strike with Navy fighters was prudent. Bringing Air Force fighter cover would have compounded problems in an already complex tanking plan. The airborne early warning provided from the decks of aircraft carriers would also have to be duplicated in the form of an AWACS from a remote location.

On the other hand, could the strike have been conducted against the same number of targets with *only* carrier assets? Such a scenario might well have proven successful, since the carrier *Saratoga* had just recently been in the Mediterranean prior to being relieved by *America*. The use of Air Force tactical air assets was effective considering the distances involved, yet very political in nature. Nonetheless, it demonstrated that tactical aircraft have the ability to successfully attack potential targets located great distances away. The number of additional aircraft which would have been necessary to equal the effectiveness of Navy aircraft in a support role would have been an extreme challenge considering the time and distance to target. Perhaps the greatest lesson learned from the strike on Libya was that Navy and Air Force assets could be mutually supportive of one another in a joint operation spanning large distances and arrive within seconds of one another to simultaneously strike targets located in relatively close proximity. El Dorado Canyon set the stage for the joint integration of air forces against multiple targets in the Gulf War to come.

•**Mayaguez Operation 1975:** On 12 May 1975 the SS *Mayaguez*, a U.S. containership, was fired upon, boarded, and seized by Cambodians in the Gulf of Thailand. Although it was not known during the early stages of the subsequent rescue attempt, the ship's crew had been removed from the *Mayaguez* and moved to the mainland of Cambodia. The carrier *Coral Sea*, enroute to Australia at the time of the seizure, was immediately ordered to the scene of the crisis. The rescue of the *Mayaguez* and its crew was planned as a joint venture involving Marine Corps, Air Force, and Navy personnel. Aircraft from the carrier *Coral Sea* were tasked with strike missions, photo reconnaissance, and combat air patrol but not close air support. Two naval combatants, the *Harold E. Holt* and the *Henry B. Wilson*, were charged with providing naval gunfire support.

Two days after the seizure, the National Security Council directed planning for a course of action that was implemented on 15 May. Marines were brought in from Okinawa and the Philippines to Utapao Air Base in Thailand. The *Holt* and *Wilson* were sent from the Philippines and several Air Force helicopters, tactical and support aircraft, were flown from Thailand's interior to Utapao Air Base.

Within the first 30 minutes of the start of the rescue attempt, three helicopters were lost and another three damaged with a total of only 22 troops inserted on the island of Koh Tang (where, mistakenly, U.S. intelligence thought the *Mayaguez* crew was *not* being held). Before the day was over, a total of 21 helicopters were exposed to enemy fire of which 13 were rendered unusable. The lack of naval gunfire support for the first two waves of helicopter assaults exacerbated the problem of inserting forces ashore. Worse still, 18 personnel were killed attempting a rescue where the captives were not being held and enemy troops were well fortified. Although the crew of

the *Mayaguez* was eventually released on 15 May, the military operation was a disaster. The ability to muster a variety of assets on short notice to the scene of a crisis was impressive; however, lack of coordination and improper utilization of forces resulted in disaster.¹⁹

The *Mayaguez* rescue could have been attempted without carrier aircraft. One could speculate that the outcome would not have differed had Navy strike aircraft not been used in a supporting attack role against the inland target of Kompong Som, which was some 40 miles from the site of the rescue attempt. Utilization of Navy tactical aircraft bore minimal impact on the confused rescue attempt at Koh Tang. The rapid pace of military operations leads to the impression that military force was rushed into action before diplomatic efforts were exhausted in an effort to obtain the release of the hostages. In retrospect, what motivated the Cambodians to eventually release their captives? Certainly they did a reasonable job of defending the island of Koh Tang against the vertical insertion of U.S. forces. Had a bombing campaign been conducted against the island or targets on the Cambodian mainland, the same end result might very well have occurred with a lower loss American life. Furthermore, it is possible that the swift coordination of assets employed could have been better orchestrated from either the *Coral Sea* or another Navy vessel. The planning and execution phases were obviously disjointed in coordination of naval gunfire and close air support while attempting to insert forces ashore. This contrasts sharply with the successful insertion of Army and Marine Corps personnel coordinated from the flagship *Guam* off the coast of Grenada. Finally, the overt movement of the carrier *Coral Sea* and placement of troops in Thailand

¹⁹ Urey W. Patrick, *The Mayaguez Operation*, Alexandria, VA: Center for Naval Analyses, April 1977 pp. 1-33.

in a slower, deliberate manner could very well have convinced the Cambodians of the seriousness of the situation. If such an approach was taken, the requisite joint planning would not have been accomplished so hastily. The *Mayaguez* incident highlights the difficulties encountered in coordinating a joint operation on short notice while attempting to employ a variety of service assets.

D. CV SUPPLEMENT - Carrier air power as a supplement to air forces that were forward based in greater numbers:

- **Vietnam Conflict 1964-1975:** Drawn into a conflict with unclear political and military objectives, carrier air power was involved from the beginning to the end of the Vietnam era. As early as August 1964, fighter aircraft from the carrier *Ticonderoga* were used against North Vietnamese torpedo patrol boats that had attacked the U.S. destroyer *Maddox* off the coast of Vietnam. During this brief encounter, four F-8 Crusaders repelled the attacking patrol boats by sinking one and forcing the others to retreat. Following the attack against the *Maddox* and a separate "apparent" attack against the *Maddox* and another destroyer, the *C. Turner Joy*, retaliatory air strikes were ordered against North Vietnamese naval bases. A total of 64 attack aircraft from the carriers *Ticonderoga* and *Constellation* were used for the first strikes by U.S. aircraft against Vietnam, marking the beginning of carrier aviation's involvement from 15 different carriers over the course of the next 11 years.

Throughout the war, carriers continued to pour waves of aircraft into an air campaign that had all indications of great success. In reality, however, the enemy had managed to repair targets that had been damaged or destroyed by U.S. tactical aircraft. The vital supply lines essential to the North

Vietnamese war effort were never severed. Although massive amounts of ordnance was delivered in hundreds of thousands of missions by Navy and Air Force aircraft, air power was not a decisive factor in bringing the war to a successful conclusion. Historian John Winton described the intensity of the Vietnam air campaign when he wrote,

"By December of 1965 ten carriers had taken part in combat action against North Vietnam during the year and nearly 57,000 sorties had been flown. Moreover by the beginning of 1966, the average weekly number of sorties flown by the U.S. in Vietnam often exceeded 25,000. A total of 7.4 million tons of bombs had been dropped on Indo-China by 1965 compared to 2 million tons in all theaters during World War II."²⁰

Yet the sheer numbers of bombs and sorties were meaningless by 1975 as the U.S. embassy in Saigon was evacuated under carrier air cover provided by *Midway* and *Enterprise*. Thousands of Americans were evacuated to ships of the Seventh Fleet, with some 2,000 placed on the carrier *Midway*. A bleak chapter in American history closed much like it had begun 11 years earlier, with two aircraft carriers conducting flight operations in the South China Sea.

To interpret the use of carrier air power during the Vietnam era as ineffective would be wrong. Many critical targets were destroyed by Navy aircraft over the course of the war. Vital sea lines of communication were protected and remained uninterrupted throughout the war effort. Although carrier air power did not perform the majority of the air sorties during the war, the fact that an additional 400 combat aircraft were in theater and available, on the average, for a wide variety of missions, helped ease requirements for land-based air. Carrier air power consistently augmented the bombing campaign taking place from forward bases in the region. Finally, the ability to safely evacuate Americans would have been exceedingly more

²⁰ Winton, pp. 111-112.

difficult to accomplish effectively if naval forces, in particular aircraft carriers, not been available when such action became inevitable.

• **Gulf War 1991:** As Iraqi forces invaded Kuwait on August 2, 1990, the only significant military units in the region were naval forces in the Indian Ocean. Within three days the carriers *Independence* and *Eisenhower* were in close enough proximity to have been called upon if an incursion of Iraqi forces down the Arabian peninsula had occurred. Although the Iraqi advance was limited to Kuwait, carrier air power was virtually the only viable alternative for power projection before the eventual arrival of Air Force units from the continental U.S.

In the following months, the logistical buildup for operations Desert Shield and Desert Storm was conducted without interruption across a sea bridge that brought 85 percent of the dry cargo and 70 percent of the sustaining supplies via maritime routes.²¹ Much like Korea and Vietnam, the unopposed build-up of forces in this distant theater was carried out primarily by sea in the absence of a credible naval threat. During the build-up phase of the operation, the Navy was busy enforcing United Nations sanctions against Iraq in the form of the economic embargo. With sanctions in place, carrier aircraft were tasked with surveillance of shipping traffic entering both the Red Sea and the Persian Gulf. The interception of thousands of merchant vessels was a key element in the overall campaign strategy against Iraq. Control of 250,000 square miles of sea lanes was accomplished in part through surveillance of shipping by carrier-based aircraft.²² Aircraft carriers, with their unique ability to position themselves where needed, were crucial in making

²¹ David F. Bond, "MAC Faces Widening Gap In Peacetime, Crisis Needs," Aviation Week & Space Technology, 9 September 1991, p. 48.

²² Dept of the Navy, Office of the Chief of Naval Operations, "The United States Navy in Desert Shield/Desert Storm," Washington, DC: 15 May 1991, pg. 22.

quarantine operations as successful as they were and continue to be (February 1992). In the conflict with Iraq, sea control was never contested. Belief that the paradigm of sea control will always hold true in the future deployment of forces may be an invalid assumption in the absence of credible naval forces.

When hostilities broke out in mid-January of 1991, carrier air power contributed over 20,000 strike sorties over 42 days against a myriad of targets.²³ Numerous missions were flown in support of Air Force strike sorties because of the unique characteristics of naval aircraft. Carrier aircraft contributed the preponderance of platforms capable of suppressing-enemy-air-defenses (SEAD). Approximately 150 naval aircraft were capable of shooting HARM missiles for SEAD missions, compared to 48 Air Force F-4G Wild Weasel shooters. In turn, this unique capability significantly enhanced the ability of both Navy and Air Force strike aircraft to perform their missions more effectively. Furthermore, the Navy's EA-6B Prowlers, whose unique electronic countermeasure suite was used extensively to jam enemy acquisition and fire control radars, undoubtedly added to the success of Allied air forces.

The air campaign, and arguably the entire war effort, could have been conducted without the six aircraft carriers that were in the theater of operations. A similar argument could be made for the use of Tomahawk land attack cruise missiles. Many of the Tomahawk targets could have been attacked by F-117 stealth bombers, yet Tomahawks were instead used during the initial stages of the war, allowing the limited number of stealth bombers to concentrate on more significant targets. The beauty of simultaneous use of land-based air, Tomahawks and carrier aviation during the opening stages of

²³ Richard M. Dunleavy, "U.S. Aviation at Sea: A National Success Story," Dept. of the Navy, Office of the Chief of Naval Operations, Washington, DC: 12 July 1991, p. 9.

the war was the synergistic effect on the enemy's defenses and communications network from which the Iraqi regime never recovered. Neither Tomahawk missiles nor carrier air power were the most significant factors of the air campaign. Yet both carrier air power and Tomahawk missiles *uniquely enhanced* the war effort contributing in part to the short duration of the war. While land-based aircraft were concentrating efforts against Iraqi targets, carrier air power along with surface ships and Allied helicopters eliminated well over 100 Iraqi naval vessels which then never presented themselves as an obstacle during the war. The additive effect of carrier air power in the Gulf War is best described by F.W. Lanchester in his writing on the "concentration of firepower,"

"One of the great questions at the root of all strategy is that of concentration; the concentration of the whole resources of a belligerent on a single purpose or object, and concurrently the concentration of the main strength of his forces, whether naval or military, at one point in the field of operations. In the cases where the individual fighting strengths of the component units may be different it has been shown that if a numerical fighting value can assigned to these units, the fighting strength of the whole force is as the square of the number multiplied by their individual strength."²⁴

"Concentration of firepower" was vividly demonstrated during the Gulf War. Facing a vastly superior coalition air force, the inferior Iraqi armed forces were confronted with the full fire of the superior Allied ground and air force. As the battle continued and the inferior force was reduced and fragmented, the fire to which the Iraqis were subjected to became more and more concentrated, ultimately leading to mass surrender and withdrawal.

Political and military analysts would have argued from the outset that Iran never would have entered the Gulf War on Iraq's behalf. The fact that

²⁴ F.W. Lanchester, Aircraft in Warfare: The Dawn of the Fourth Arm, (London, England: Constable and Company, Ltd), pp. 39-54.

Iran never played an adversarial role in the war was a major benefit to the Allied cause. Land-based air operating from Saudi Arabia never concerned itself with defending bases from an Iranian threat. The fact that four carriers with a total of 350 aircraft in the Persian Gulf stood between Iran and land-based forces in Saudi Arabia, essentially created a buffer zone through which neither Iraq or Iran could venture with ships or aircraft.

Heated comparisons contrasting the advantages and drawbacks between carrier air power and land-based air have intensified since the Gulf War terminated and the battle for future defense funds has begun. Without a doubt, land-based air was in a much better position to deliver the brunt of the combat air power during the war. Because of the constraints inherent in flying aircraft from carriers, it is highly unlikely carrier aircraft will *ever* deliver more ordnance over a given distance than a similar type aircraft optimized for land-based operations. The Gulf War, however, emphasizes some of the unique aspects of carrier-based air power. Before and during the war, carrier aviation flew 'round-the-clock' defensive combat air patrol missions protecting Allied warships in the Persian Gulf. As aircraft and personnel were withdrawn from the region following war termination, carrier aircraft continued patrol missions in both northern and southern Iraq as Kurd and Shiite populations were resettled in the aftermath of the war. As a result of continued carrier presence after the war, the rather tenuous requirement of maintaining U.S. tactical aircraft on foreign soil was eased since carrier aircraft assumed the peacekeeping mission as United Nations observers examined Iraq's nuclear and chemical facilities. Concurrently, carrier presence ensured that economic sanctions remained in effect as long as necessary.

After close examination of the Gulf War as it applies to carrier air power, it is obvious that, in addition to performing all the other missions associated with maritime operations, the Navy was able to provide to joint planners enough carrier strike assets over the course of the war to destroy a significant number of Iraqi targets, which in turn enhanced the overall war effort.

CONCLUSIONS FROM HISTORICAL CASES.

In examining and comparing a wide spectrum of scenarios and manner in which carrier air power has been utilized since World War II, some of the following recurring themes emerge which address the importance of carrier aviation as a tool of national defense.

Crisis Response

Carrier aviation has typically arrived at the scene of a crisis within days of its inception as evidenced in some of the aforementioned cases. Table 1 lists the various crisis situations to which carriers and their attendant battle groups have responded since the Vietnam conflict.

Table 1. Carrier Battle Group Responses to Crises Since the Vietnam War

<u>Year</u>	<u>Crisis</u>	<u>CVs</u>	<u>Year</u>	<u>Crisis</u>	<u>CVs</u>
1974	Cyprus	2	1983	Libya-Chad	1
1975	Cyprus Unrest	1	1983	Marine Barracks Bomb	2
1975	Eagle Pull, Cambodia	1	1983	Iran-Iraq	1
1975	Frequent Wind, Vietnam	4	1983	Korea-Burma	1
1975	Mayaguez	2	1983	Grenada	1
1975	Lebanon	1	1983	Syria	1
1976	Kenya-Uganda	1	1984	Central America	1
1976	Korean Tree Incident	1	1984	Persian Gulf	1
1977	Uganda	1	1984	Saudi Hijacking	1
1978	Afghanistan	1	1984	Cuba	1
1978	Iranian Revolution	1	1985	U.S. Pers. in Lebanon	1
1979	China-Vietnam	1	1985	TWA 847 Hijacking	1
1979	Yemen	1	1985	Achille Lauro*	1
1979	Soviet Troops in Cuba	1	1985	Egypt Air Hijacking	1
1979	Afghan/Iran Hostages	2	1986	OVL-FON Ops	3
1979	Park-Chung Hee	1	1986	La Belle Disco, Libya	2
1980	Korea	1	1987	Persian Gulf Ops	2
1981	Iran-Iraq War	2	1987	Hostages in Lebanon	1
1981	Syria	2	1988	Summer Olympics	2
1981	Libya	2	1988	Maldives Coup	1
1981	Sadat-Sudan	1	1989	Lebanon Civil War	1
1981	Central America	2	1989	Panama Elections	1
1982	Israeli Invasion	1	1989	China Civil Unrest	1
1982	Peacekeeping Force	2	1989	Hostages in Lebanon	2
1982	Palestinian Massacre	2	1989	Philippines	2
1983	Honduras	1	1990	Desert Shield/Storm	6

Source: Perin, David, "A Comparison of Long-Range Bombers and Naval Forces," CNA 91-2242 Working Paper, Alexandria, VA: November 1991, p.9.

The forward deployed nature of the carrier has continually ensured its immediate availability upon arrival at a crisis scene because of its self-contained nature. The carrier's ability to remain indefinitely in a given region allows policy makers to choose from a wider latitude in selecting appropriate courses of action as indicated in the Jordanian crisis. The knowledge that carriers are in a given area as a passive or active presence compellingly "signals" to both allies and enemies.

Sea Control

An implicit assumption exists that the logistical buildup and resupply effort that has been unchallenged since the convoys of World War II will continue in future military ventures. During any conflict, the vast majority of war materiel and supplies will be sent via sealift. Since fewer overseas facilities will be available in the future, the distance surface vessels will transit without stopping will be longer. In 1990 there were 41 countries with naval mining capability and a similar number that operate diesel attack submarines; in the third world alone, there are nearly 250 diesel submarines.²⁵ The notion that unchallenged logistical movement across the vast reaches of the world will continue as a matter of course is presumptuous given the increasingly commonplace transfer of technology. The sinking of the *Atlantic Conveyor* by the Argentines during the Falklands War greatly complicated matters for the British amphibious assault on Port Stanley. Lost along with the *Atlantic Conveyor* were the few Chinook helicopters that were to transport troops 50 miles to the target area of Port Stanley after an amphibious assault on the opposite side of East Falkland Island at San Carlos.

Air Superiority in Amphibious Operations Support

Carrier aviation has always been capable of supporting the Marine Corps expeditionary mission of amphibious warfare. Support of forces in close contact with the enemy was one of the most critical aspects of the Korean War and operations in Grenada. There is no guarantee that forward airfields will always exist in convenient proximity to crisis operations. This

²⁵ Committee on Armed Services, House of Representatives, Hearings on Seapower and Strategic and Critical Materials Subcommittee Hearings on Seapower, Washington DC July 1990 p. 5.

crucial lesson was evident in Korea when the sole option to reenter the conflict through an amphibious assault at Inchon depended upon air support from the only available aviation assets, which happened to arrive from U.S. aircraft carriers. Similar conditions existed temporarily in Grenada when it was discovered that the Point Salines airfield had so many physical obstructions that aircraft were unable to land early in the operation.²⁶

Awareness that future defense challenges will most likely have contingencies in third world regions, lacking access to forward bases accentuates the need for carrier air power.

Force Enhancement

Carrier air power can serve as a force multiplier in the presence of coalition air forces. As was shown in the Gulf War, Lanchester's principle of "concentration of firepower" is strengthened through the use of naval air forces. The synergistic effect of additional combat air power may have an exponential impact on combat operations when combined with other air forces in a combat theater. Moreover, the psychological impact of a joint venture such as the Israeli-American air plan of 1970 may have served as enough of an influence on the Syrian government to make the decision to withdraw from Jordan. Singularly, one carrier may be quite inferior to the striking power of many third world nations, yet the psychological influence of its movement may be influential in the thought processes of belligerent leaders.

²⁶ Harding, p.24.

Maritime Mission Support

Many missions performed by carrier aircraft are overlooked since they are either not frequently performed or go unchallenged. The mission of mining accomplished by carrier aircraft is often overlooked since it is a capability seldom implemented. The interdiction of shipping in support of a quarantine or blockade is another mission that is expected to be accomplished accurately and expeditiously by naval forces. Setting barrier combat air patrols in support of land operations may go without challenge or notice if performed correctly by carrier air power. The comparison of carrier-air to land-based air is logical since both overlap in pursuit of power projection ashore. However, a better method for comparison would be to investigate the ability of land-based air's proficiency to perform maritime missions at varying ranges from either a fixed base or deployment site. Undoubtedly, land-based air would often be constrained by the availability of tanker assets to complete naval missions in some of the distant maritime reaches of the world.

CHAPTER III

THE EVOLVING THREAT

Now that the U.S. has concluded fighting the "war that would never be fought" it can concentrate on new world threats instead of the old world Soviet threat.²⁷ The Gulf War should well have served as a wake-up call for the U.S. to realize there are radical dictators, such as Saddam Hussein, willing to confront U.S. resolve to respond to challenges against American interests. As such, the Gulf War may very well serve more as a model for the future than the anomaly it was originally thought to be.

The threat in the Gulf turned out to be more than just a menace to an energy resource. There were in fact numerous threats; an ever-expanding regional power with a large military, state-sponsored terrorism, and an active program seeking nuclear weaponry. At stake was the spread of instability throughout a region of the world already at risk. Had Saddam Hussein not been stopped, the means by which to hold the civilized world hostage would have been well within his reach through weapons of mass destruction and control of a large share of the world's oil reserves. With Hussein still in power it is not unlikely that another Desert Storm scenario will not come to pass in the future. As the *New York Times* detailed in an article concerning some of the Pentagon's hypothetical conflicts of the future,

²⁷ Interview with Captain Daniel W. Gabriel, Commander Carrier Air Wing 11, NAS Miramar CA: 5 January 1992.

"Iraq could rebuild its military, re-equip its tank divisions and purchase 100-150 aircraft to fill out its air force. Iraqi objectives for an attack would be to promptly take control of the oil fields and major export terminals in Kuwait and northeastern Saudi Arabia before the U.S. and its coalition partners could respond."²⁸

For the Navy, this translates into being ready to respond to a variety of contingencies, ranging from local sea-control to a multi-carrier offensive campaign. The threat may range from a single terrorist group to a coalition of third-world militants. The new threat may be more complex and deceptive than the former Soviet threat in many ways. Figure 7 contrasts some of the characteristics of the old Soviet threat

OLD

Soviet Military Power

Deliberate Soviet Attack

Economic Power Assumed
High Defense Budgets
Global Security Concerns
Paramount

NEW

Spread of Nuclear Weapons
Terrorism
Regional Thugs
Drug Traffickers
Instability in the Former Soviet
Republics
Japanese Economic Power
Declining Defense Budgets
Domestic Security Concerns
Paramount

Figure 7.

Source: Les Aspin, Chairman House Armed Services Committee, "National Security in the 1990's: Defining a New Basis for US Military Forces," 6 January 1992, p. 10.

with those of the new diverse set of threats, while Figure 8 delineates possible future problems which may occur and those parts of the world which may be affected.

²⁸ Patrick E. Tyler, "Pentagon Imagines New Enemies To Fight in Post-Cold-War Era," New York Times, 17 February 1992, p. A8.

INCREASED RISK OF REGIONAL CONFLICT

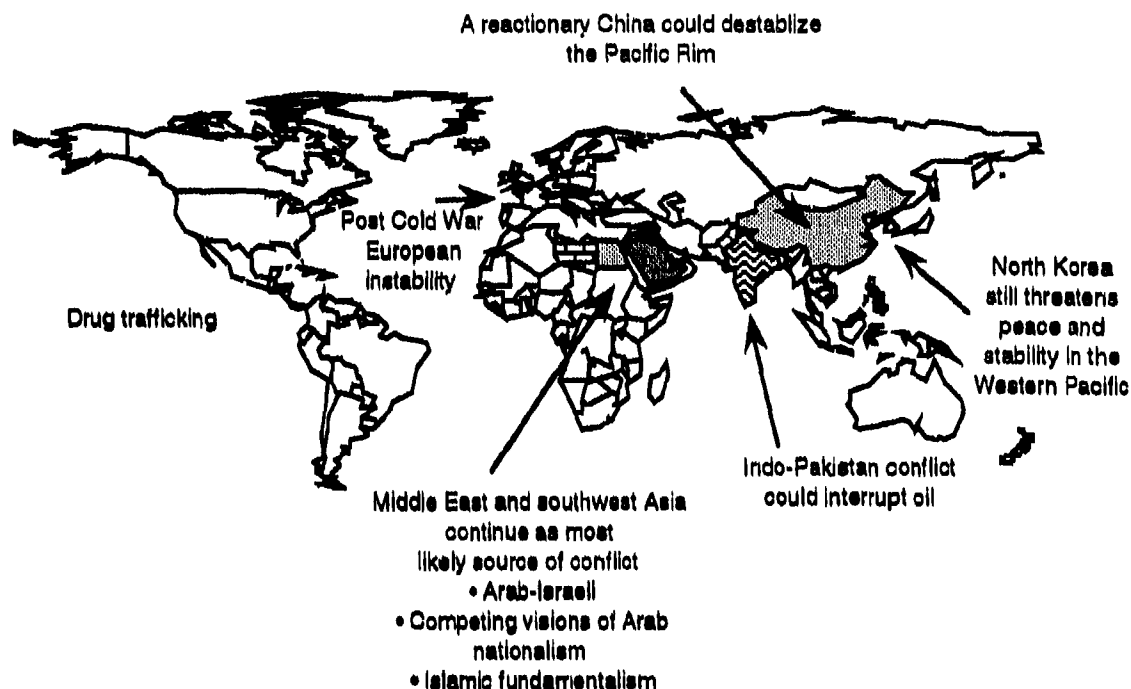


Figure 8.

Source: ACNO AIR WARFARE (OP-05), America's Carrier Battle Groups: Lasting Requirements in a Period of Global Change.

Representative Les Aspin aptly describes the evolving threat,

"The new post-Soviet threat is, in many ways, more disturbing and troublesome than the old Soviet threat. The old threat was bigger, but more manageable. The new threat is more alien to Americans and is more difficult to understand and handle. America will find it more difficult to understand what the threats are and when they are important enough to consider the use of force."²⁹

The new threat will bear great resemblance to the adversaries the Navy was often pitted against in the past decade; third world nations with credible military forces such as Iraq, Libya, and Syria. Global trouble spots will crop up as the spread of advanced weaponry is intensified through political,

²⁹ Aspin, pp. 10-12.

demographic, and religious tensions. In many ways, the foe of the future will be unchanged with the exception of the former Soviet Union. Old fragments of the Soviet military could very well be pieced together under the auspices of the Russian Republic to face off against the autonomous Baltic states, necessitating military intervention by the U.S. Carrier air power will continue to be tasked with bringing a limited, yet credible, high technology reserve of air power against a variety of regional threats worldwide. As in the past, aircraft carriers and their air wings will be expected to arrive in a theater of operations with a self-contained, flexible package of weaponry to either protect the fleet or conduct offensive strike operations.

CHAPTER IV

CARRIER AIR SUBSTITUTES; PROS AND CONS

Heated debate has continued over the years concerning the future application of carrier air power and what emerging technologies might render these colossal, extremely expensive vessels obsolete. The process of challenge and comparison only makes sense, particularly in times of stringent defense funding and the decreasing threat of global war. Similar discussions took place arguing the merits of dirigibles versus propeller-driven airplanes in the 1940's. Likewise, the strategic bomber with its nuclear bombing capability was argued to possess enough virtues to win wars without the need to ever engage the enemy on the ground. Yet the need for a mix of forces has continued over the decades and perhaps the one axiom that has held true is that "the more things have changed the more they remain the same." Figure 9 graphically illustrates both common and unique characteristics of the three types of American aerial striking power. Pertaining to carrier air power, what will determine the future of the aircraft carrier and its accompanying air wing? Is it an article of faith, a love affair with large warships, or true need that is driving the U.S. to appropriate funds for a ninth *Nimitz*-class carrier (CVN-76) to begin construction in 1995? A look at some of the possible alternatives to carrier aviation along with their strengths and weaknesses is worthwhile in an effort to understand its continued requirement or obsolescence.

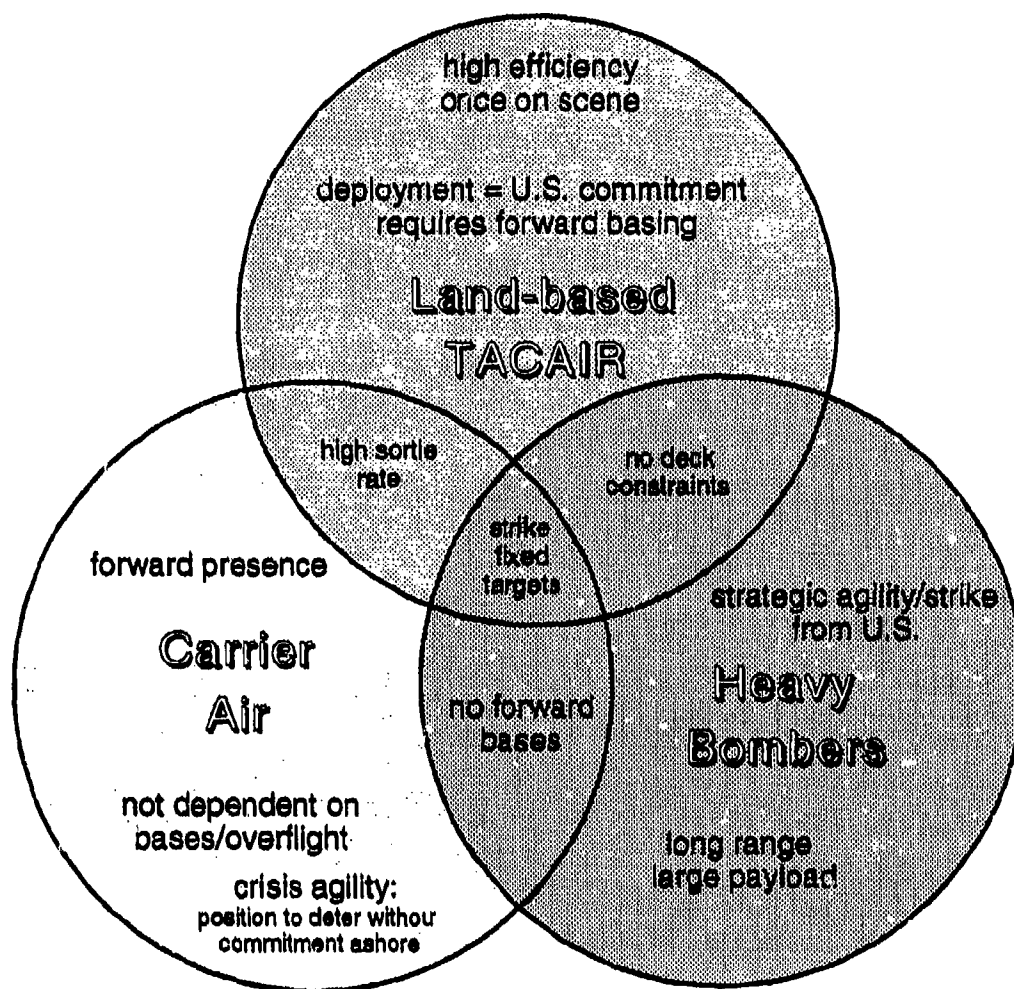


Figure 9.

Source: Perin, David, "A Comparison of Long-Range Bombers and Naval Forces," CNA 91-2242 Working Paper, Alexandria, VA: November 1991, p. 58.

CARRIER AIRCRAFT VERSUS LAND-BASED AIRCRAFT

As previously mentioned, a land-based aircraft designed with a similar mission will almost always have an advantage in range over its carrier-based counterpart. The penalties of heavier landing gear and airframes structure to withstand the punishment inflicted during carrier catapult and arrested landing typically penalize a carrier-based aircraft in performance or distance flown. With the advent of composite structures, tremendous gains have been made for all aircraft in realizing greater thrust-to-weight ratios through

lighter, stronger materials. Perhaps the greatest strength that land-based air has over carrier air is the massing of airpower at a facility that can typically handle a significant number of aircraft. In contrast, carrier aircraft can be employed from an infinite number of places dependent on the location of the aircraft carrier.

The Air Force typically employs three categories of bases in deploying airpower. The first category includes aircraft based in the continental U.S. Although many bases will soon close to accommodate a force structure intended to be 33 percent its present size, an adequate number of bases exist for the maintenance of the Air Force's mission. The second category of base includes those facilities that are permanently maintained overseas in locations such as Germany, Turkey, Japan and England. Like U.S. bases, many of these forward bases, such as Clark AFB in the Philippines and those in Spain, will soon be closed if they have not already. Finally, the third category of expeditionary bases, such as those used in Saudi Arabia and Bahrain during the Gulf War, provide land-based air the capability to conduct combat operations in close proximity to the battle area. The shortened distances experienced in the Gulf War as a result of the tremendous infrastructure that had been developed by the Saudi government created an ideal situation for hundreds of tactical aircraft to operate from a variety of bases dispersed throughout Saudi Arabia.

Was the Gulf War an aberration or the norm for the future deployment and projection of air power? Unless the U.S. finds itself fighting another war in the Gulf region, it is highly unlikely our allies will find such an ideal system of ports, airports and highways within the region of deployment. The assumption that allies will allow U.S. aircraft to deploy and operate from bases within their countries is a delicate proposition that is

usually not resolved unless an immediate threat to the host nation is perceived.³⁰ Even then, the deployment and build-up stage of tactical assets is a laborious process. An example is the deployment of 72 aircraft from a tactical fighter wing. Although aircraft can be on the ground within days of notification, the logistics train that arrives concurrently and afterward is tremendous. Over 220 C-141 Starlifter aircraft are required to transport the equipment for a composite tactical fighter wing, not including water, fuel and additional ordnance required for day-to-day operations. Air defense assets such as the Patriot system require an additional 15 C-5 Galaxy aircraft to accommodate a single Patriot battalion that is made up of 9 batteries.³¹ The Air Force had not achieved parity with Iraq in terms of sheer numbers of tactical aircraft until 35 days from the time the decision to deploy had been made.³² Finally, as a result of the Gulf War, the future capability to lift such assets was severely impacted as many of the heavy airlift aircraft such as the C-141 were literally put through the final stages of their useful lives.³³ Until the C-17 is procured, a lack of airlift will exist to accommodate operations similar to the deployment that occurred during Desert Shield/Storm.

When Navy and Air Force fighter and strike assets are compared in terms of deployment time to the Gulf, some interesting observations can be made. Although two AWACS and two F-15 squadrons were in theater within three days of the go-ahead deployment decision, Figure 10a shows 40 F-15 fighter aircraft in theater comprised only half of the fighter assets

³⁰ Interview with Ronald O'Rourke, Coordinator Specialist in National Defense Foreign Affairs and National Defense Division, Congressional Research Service, Washington, DC, 10 December 1991.

³¹ "Desert Storm Almanac," Military Technology, No. 6/91 June 1991, p. 118.

³² Ibid., 120.

³³ Bond, p. 50.

available when contrasted to Navy fighters (F-14's and FA-18's) on the two carriers that were already in place upon arrival of the F-15's.

DESERT SHIELD Air Defenses on-scene at crisis + 3

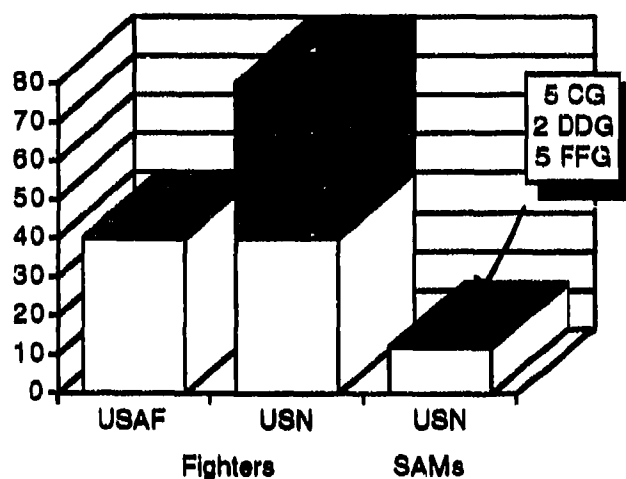


Figure 10a.

Source: Perin, David, "A Comparison of Long-Range Bombers and Naval Forces," CNA 91-2242 Working Paper, Alexandria, VA: November 1991, p.16.

More importantly, Navy assets were fully supported logistically with all levels of maintenance repair facilities in addition to many weeks' worth of ordnance stored both on the carrier and on ammunition supply ships in theater. Of equal importance, until U.S. Air Force F-16, F-117 and A-10 aircraft began to arrive in Saudi Arabia 15 days after the decision to deploy was made (refer to Figure 10b) only Navy A-6E and Navy and Marine Corps FA-18 aircraft were capable of accomplishing immediate strike missions in the event of an Iraqi advance into Saudi Arabia during the two weeks after the invasion of Kuwait. Both carrier-based Navy aircraft and forward deployed Marine Corps aircraft could have accomplished sustained operations immediately because of the nature in which both are deployed. This does not suggest that Navy and Marine Corps aircraft could have continued to match land-based

aircraft accomplishments once the deployment phase was complete. Yet a different, adverse outcome might have resulted in the absence of forward-deployed, self-sustaining forces if Iraq had elected to invade Saudi Arabia in addition to Kuwait. It is not too far fetched to imagine that it would be possible for the Arabian peninsula and its infrastructure to be overrun while a two-week deployment was underway or negotiations for basing rights were being discussed.

DESERT SHIELD Strike Aircraft on-scene at crisis + 3

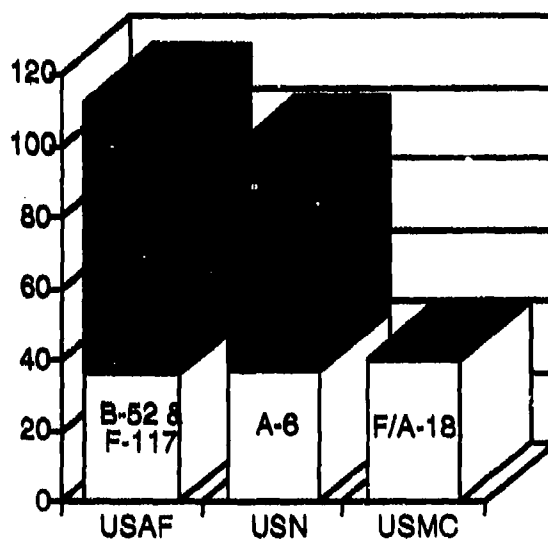


Figure 10b.

Source: Perin, David, "A Comparison of Long-Range Bombers and Naval Forces," CNA 91-2242 Working Paper, Alexandria, VA: November 1991, p. 16.

Extracting a foe from the very facilities that are part of the deployment scheme might have proven exceedingly difficult.

When aircraft carriers are forward deployed, they essentially fill a known void of time between deployment, arrival and full-fledged sustainment that land-based aircraft require. A carrier air wing will never have the ability to generate the number of sorties that the Air Force is capable

of with abundant ramp space and host facilities. Yet herein lies the dilemma; time to deploy and a place to land. A logical solution would be a stealthy strike aircraft that could deploy within hours anywhere in the world, not require basing and return to the U.S. upon mission completion. Could such an aircraft then render the role of the carrier obsolete? Enter the B-2 bomber....

THE B-2 BOMBER

In his State of the Union address on 28 January 1992, President Bush proposed halting production of the B-2 bomber at a total of 20 aircraft. The B-2, with its intercontinental flight and purported radar evasion capabilities, has been suggested as a replacement for the aircraft carrier and its complement of strike aircraft. The rationale for the B-2 is that it can attack high-value fixed targets like headquarters, communications facilities, industrial sites and other centers for war-making capabilities that may be heavily defended by surface-to-air weapons and airborne fighters. By accentuating its strengths and versatility, the Air Force has attempted to gain universal acceptance of the highly-controversial B-2 by decision-makers, viewing carrier air power as a competitor that may draw away the necessary funding. Studies that have attempted to quantitatively compare the two types of striking power generally indicate (depending upon a given study's assumptions) that either option can beat the other statistically on paper. On a broader level, how do the two types of assets compare? Can both be tasked with the same mission or are they uniquely qualified? Are they redundant, complementary or dissimilar assets? The strengths and weaknesses of each are explored below:

Strengths of the B-2:

- The B-2 would be the only manned stealth platform with significant ordnance loads designed specifically for the mission of "deep strike." Until completion of research and development on the AX (the Navy's version of a long-range stealthy bomber), the B-2 and the F-117 will be the only true stealthy manned aircraft for the delivery of ordnance.

- The B-2 would employ the most up-to-date munitions which should increase its accuracy against any given target.

- The B-2 would be an aircraft ideally suited for retaliatory strike missions such as Syria in 1983 and Libya in 1986 as previously described. Three B-2's could simultaneously strike 3 different targets and achieve better results without support aircraft other than tankers in such limited scenarios.

- Escort aircraft such as fighters, airborne early warning and electronic countermeasure aircraft will not be required if the B-2 can effectively avoid radar detection. As a result, the life cycle costs of supporting additional aircraft could be reduced substantially if the B-2 can accomplish the strike mission in their stead. The counter argument to this theory suggests that there simply will not be enough B-2's to conduct anything but limited operations against point targets as opposed to repeatedly striking hundreds of targets daily over the course of a campaign. Since the B-2 would perform the majority of its missions at night, it would only assist as a force multiplier during the hours of darkness. As a result, any missions executed during the daylight hours of a bombing campaign would not decrease the normally required numbers of support aircraft.

Weaknesses of the B-2:

- If a maximum of 20 B-2 aircraft are procured, the number of missions and targets they can attack on a global basis at any one time will be limited. Even Air Force officials argue purchasing only 15 to 20 B-2 aircraft "makes no operational or economic sense."³⁴

- The B-2 has no "presence" value. Aircraft that are hangared in the continental United States are only a "threat in being." Until actually used against an adversary, the existence of a B-2 can only serve as an empty, invisible threat.

- The B-2 cannot serve as an overt, visible symbol of American military power since a cloak of security will undoubtedly surround these scarce, expensive aircraft.

- Unlike carriers which have the ability to transit and hold, awaiting further orders, the B-2 permits very little latitude in the pursuit of a diplomatic solution to a crisis once the threat of use is declared. If not acted upon, use of the B-2 will appear to be a hollow threat.

- With a price tag of nearly \$1 billion apiece, and scanty in number, the B-2 would be the first aircraft in aviation history expected to maintain zero attrition in testing, training and combat. The B-2's predecessor, the B-1B, was scrutinized closely after a total of three aircraft were lost in training.³⁵ With five times the number of aircraft in the current B-1B inventory (97 total) and a per-aircraft cost that is less than one-third that of the B-2, the B-1B fleet is nevertheless closely monitored and guarded.

³⁴ David A. Fulghum, "TAC Orders Studies on Uses for 15 B-2s Despite Doubts on Small Fleet's Viability," Aviation Week & Space Technology, 16/23 December 1991, p. 23.

³⁵ Interview with Major Stephen E. Wright, USAF, B-1B pilot, U.S. Naval War College, Newport, RI, 17 January 1992.

- Due to the projected meager numbers of B-2's, restrike capability would be very limited. B-2 bombers will not be conducive to rapid re-arm and return to a target if they are employed over intercontinental ranges.

- Since the B-2 will perform only a strike mission, it will be unable to maintain air superiority over a target area. Furthermore, its singular "bomb and return" mission is not conducive to a follow-on peacekeeping mission which has been performed extensively by carrier aircraft since the termination of hostilities in Iraq.

- No matter how unlikely the probability that a B-2 will be shot down, it will still be subject to a certain degree of risk while prosecuting well defended targets. Although no current defenses are capable of electronically tracking the B-2, future technological advancements *could* jeopardize or nullify its stealth characteristics.

- In the absence of sophisticated electronic warning equipment or integrated defense networks, employment of a B-2 is not required. As a military campaign progresses, many targets may not necessitate the use of precision-guided munitions nor do they require an expensive delivery platform to drop the necessary ordnance.

- It has been argued that the B-2 could absorb a certain number of naval missions which would reduce carrier deployment. Much of the sea control mission the Navy is designed to perform requires constant ocean surveillance involving the continual presence of ships over a given area versus occasional patrol by one or two aircraft. The function of maritime patrol is already accomplished by existing carrier-based and/or land-based aircraft. Both possess the capability to attack combatants at ranges well in excess of most ship defenses. As such, there is no need for the B-2 to assume a maritime patrol mission. Virtually the only effective and useful maritime

mission available for the B-2 would be the aerial seeding of ocean mines. Little if any discussion has centered around this aspect of employment for the B-2; yet, until the AX arrives, the stealthy delivery of mines is currently unavailable.

CRUISE MISSILES: REPLACEMENT OR COMPLEMENT?

Since unmanned vehicles were first built and flown, debate has continued over the possibility that vehicles like the cruise missile would some day render manned aircraft obsolete. The Persian Gulf War was the first combat test for the Tomahawk Land Attack Missile (TLAM). Capable of being launched from either a submarine or a surface ship, the Tomahawk was used in the early stages of the war to attack fixed, high-value command and control facilities as well as other key nodes critical to the Iraqi defense network. Relying on a complex guidance system to fly itself up to 750 nautical miles to a target, the Tomahawk appears to have performed up to expectations during the war. Of the 288 Tomahawks fired during Desert Storm, 80 to 85 percent appear to have hit their targets.³⁶ If cruise missiles are so accurate, why would defense planners continue to design manned vehicles that essentially accomplish the same agenda as the cruise missile? Like the B-2, an examination of the cruise missile's strengths and weaknesses is important when considered as a future force option:

Cruise Missile Strong Points:

- The cost of a single Tomahawk cruise missile averages \$1.4 to \$2.0 million, a mere fraction of the cost compared to the price of procuring and

³⁶ Ronald O'Rourke, "Persian Gulf War: Defense-Policy Implication for Congress," Congressional Research Service, 91-421F, May 1991, pp. 28-29.

maintaining a carrier air wing. Once fired, the Tomahawk cost becomes sunk in every sense of the word since it is a one-time weapon.

- Cruise missiles cannot result in the loss of aircrew life or become prisoners of war. They are therefore weapons of choice for use against highly defended targets where allowable risk exceeds the value of exposure of manned, non-stealth aircraft. Had it been available then, the Tomahawk would have been an excellent weapon for use against Syria in 1983.

- Tomahawk missiles are distributed amongst numerous surface and subsurface platforms which makes targeting their destruction difficult. Furthermore, a submarine can covertly bring a cruise missile to bear without risking exposure to surface forces. Thus, cruise missiles can be delivered at great distances without the need for carrier forces or land-based aircraft.

- Improvements to the Tomahawk cruise missile are already being realized. Capabilities such as data-link to airborne aircraft for terminal guidance, more precise mid-course guidance through the Global Positioning System (GPS), and improved ranges on the order of 1,000 nautical miles are some of the current developments.³⁷ Future considerations could include the application of stealth technology to increase the missile's current survivability.³⁸

Cruise Missile Shortcomings:

- Cruise missiles are not reusable and cannot be fired again if connection is not made with the intended target. Conventional aircraft can carry multiple bombs and can continue to return to strike the same target or another target. During Desert Storm, the Navy suffered an aircraft attrition

³⁷ David F. Bond, "Navy Weighs Tomahawk Block 3 Buy; Further Upgrades Face Cost Squeeze," Aviation Week & Space Technology, 6 January 1992, p. 27.

³⁸ David F. Bond, "Stealth-Standoff Issue Looms In 21st Century Weapon Choices," Aviation Week & Space Technology, 13 January 1992, p. 64.

rate of 2 percent overall. The great majority of strike aircraft flew an average of 40 to 50 missions over the course of the 44 day war with Iraq.³⁹

- A cruise missile carries a 1,000 pound warhead. Many carrier attack aircraft carry between 8 and 16 bombs of similar destructive power per bomb on each aircraft on every mission. The cost of placing a cruise missile on every target would be extremely expensive if such an approach was adopted in a long-term campaign (absent conventional aircraft). For 42 days during the Gulf War, Coalition air forces flew 2,000 strike sorties per day against Iraqi targets.⁴⁰ In a simplistic, conservative theoretical scenario, if each aircraft dropped only two 1,000 pound bombs per sortie for 42 days, an equivalent 168,000 cruise missiles valued at \$168 billion (calculated on a nominal value of \$1,000,000 per missile) would be required to fill the conventional aircraft strike role.

- Bomb damage assessment (BDA) is not readily obtained from a cruise missile. Although tactical aircraft cannot report BDA with total accuracy, aircrews are in a position to reasonably appraise target damage, through visual means or recorded video.

- Cruise missiles are not currently capable of attacking mobile targets such as convoys or tanks on the move. Moreover, many targets are not worth the expenditure of a million dollar plus weapon for their destruction when a \$750 bomb will accomplish the same task. Likewise, the cruise missile is not capable of changing the intended target once it is released from the launch platform. Manned aircraft, however, can alter aim points and targets as appropriate while delivering ordnance.

³⁹ Author's calculations; considering most pilots flew 25-30 missions and 1.7 pilots/plane= 40-50 missions per usable aircraft.

⁴⁰ Riley D. Mixson, "Desert Storm A Perspective of Navy Air Contributions," The Hook-Journal of Carrier Aviation, Winter 1991, p. 2.

- During the Gulf War, cruise missiles were effective against targets with exposed surfaces (such as communications facilities) which could be eliminated by the blast of a weapon detonated above the target. For targets such as hardened bunkers made of reinforced concrete, cruise missiles are currently ineffective. Weapons dropped from strike aircraft with penetrability and greater killing power (hardened 2,000 pound bombs) were required to attack and destroy such targets.

- Only aircrews in tactical aircraft exercise judgment and make instantaneous decisions as to whether and how to attack a target. Tactical aircraft can divert to alternate targets when working with forward air controllers as situations on the battlefield evolve. Following the cease-fire in the Gulf, peacekeeping operations utilizing combat aircraft to ensure resettlement of the civil population were executed in accordance with war termination agreements. Cruise missiles cannot report back for guidance or make decisions to attack if the situation warrants a response in a peacekeeping scenario.

Cruise missiles are neither direct competitors to manned aircraft nor replacements for manned carrier air power. The cruise missile is a complementary weapon that, used either alone or in conjunction with conventional air power, provides a unique dimension to strike warfare that had never been previously realized. When used appropriately, as they were during the opening hours of the air campaign against Iraq, cruise missiles are the best option to attack key targets that would otherwise risk both an aircrew and a valuable aircraft intended for repeat missions. As refinement of penetrability, "bang-per-buck," and stealth capability continue, cruise missiles will become a primary tool for employment against an expanded array of targets. Like manned aircraft, cruise missiles are not universal target

weapons; however, they make valuable and unique contributions for some specific purposes and scenarios.

REPLACING CARRIERS WITH SURFACE ACTION GROUPS.

The Navy has continually deployed its surface vessels in both mutually supportive roles as well as independently. Arguably, for peacetime "presence" operations, the Surface Action Group (SAG - a small, diverse contingent of surface warships), would fulfill the same function as a carrier yet at a much lower cost. SAG's could execute "show-the-flag" operations throughout the world in addition to providing a certain amount of power projection in the event of a crisis. What are the strengths and weaknesses of a SAG with its complement of offensive and defensive weapons? Can a SAG assume the traditional role of the aircraft carrier?

The Positive Side of the Surface Action Group.

- Compared to a carrier, the SAG requires only a fraction of the initial investment for construction as well as continued lower operations and support costs.
- The SAG is currently capable of self-defense against aircraft and engagement of enemy ships at sea. As a device for sea control, the SAG is ideally suited for a variety of mission areas.
- With Tomahawk missiles, the SAG possesses the ability to strike a limited number of targets ashore.

The Down Side of the Surface Action Group.

- The SAG does not possess assets to survey the ocean's surface or adjoining airspace for adversary ships or aircraft at long-range. Without a

complement of fixed-wing aircraft that can travel hundreds of miles each hour, surface combatants are dependent upon external sources for surface and air surveillance. Only through coordination of efforts with maritime patrol aircraft (P-3C Orion aircraft) can a SAG determine the surface picture hundreds of miles beyond its present position.

- Although the SAG is capable of self-defense against attacks by adversary aircraft and cruise missiles, its point defenses primarily rely upon electronic intelligence. In 1988, on the basis of a rapid decision prompted solely by electronic information in a critical time frame, the Aegis cruiser *Vincennes* shot down an Iranian airliner mistaken for a tactical aircraft in a combat zone. The difficulty the SAG encounters in sorting and identifying adversarial aircraft is exacerbated by limited access to information.

Conversely, carrier aircraft intercepting the same enemy do so at longer ranges and with the frequent luxury of visually sighting the aircraft.

- The prospect of more countries armed with longer range air-to-surface weapons will further increase the vulnerability of surface combatants.

- The SAG can only attack a small number of targets with a limited number of Tomahawk cruise missiles in its possession.

The Surface Action Group can serve as a convenient, suitable substitute for a carrier and its battle group in a benign, peaceful environment. Surface combatants are designed for limited, specific missions. Like carriers, surface ships are more effective at some missions such as anti-submarine warfare or anti-air warfare than missions such as the destruction of an entire military complex hundreds of miles inland. Surface ships can also be utilized independently when warranted by the timing and scenario. However,

attempts to employ them for all roles at any time significantly diminishes their effectiveness.

AMPHIBIOUS SHIPS IN LIEU OF CARRIERS

The Amphibious Readiness Group (ARG) is designed to support the insertion of Marine expeditionary forces ashore. The ARG is normally a complement of five ships centered around an amphibious assault ship such as an LHD or LHA. With a combination of Vertical Short Takeoff and Land (VSTOL) aircraft and helicopters aboard a variety of large platforms, use of these vessels has been proposed as an alternative to the carrier. Typically, amphibious ships deploy with a combination of 6 to 8 AV-8B Harrier attack aircraft and 20 to 30 helicopters. Up to 20 Harriers may be carried depending upon the number of helicopters given up to do so.

The LHD is 844 feet in length which makes it nearly the size of a carrier. Vessels such as the LHA, LHD and LPH are both highly visible and capable of attacking land targets with the AV-8B Harrier. Upon initial examination, amphibious ships would appear to be an ideal substitute for aircraft carriers. Like their surface combatant counterparts, amphibious ships are significantly less costly to build than carriers. The newest and largest class, the *Wasp*-class LHD, is one-fourth the cost of a new \$980 million *Nimitz*-class carrier.⁴¹ With the capability of filling both amphibious and strike roles, the LHD would appear to be prepared to accomplish either an expeditionary mission for the insertion of troops or strike targets ashore with its Harrier aircraft. The total striking power on board an amphibious ship is a function of the composite mix of VSTOL aircraft and helicopters. With only 6 to 8

⁴¹ J.E. O'Neil, Jr., "Amphibious Big Decks=Naval Presence," U.S. Naval Institute Proceedings, February 1992, p. 63.

Harriers aboard, the number of missions flown in a given day is limited in contrast to a carrier. Table 2 contrasts an amphibious assault ship and its complement of 8 Harriers to a *Nimitz*-class carrier air wing, utilizing 40 strike aircraft, both flying the same number of cycles per day with the same percentage of aircraft in a fully mission-capable status (FMC).

The most significant difference between VSTOL and conventional takeoff and landing aircraft is the amount of ordnance that can be carried by each type aircraft. Since carrier aircraft are assisted in launch by a catapult, the gross takeoff weights and respective ordnance carried is significantly higher than the Harrier which launches vertically after a short takeoff roll. If the

Table 2. VSTOL-CTOL Comparison

	AV-8B (8 A/C)	20 A-6E & 20 FA-18
A/C Available 90% FMC (1)	7	36
Sorties per Day (7 Cycles) (2)	24 Sorties	77 Sorties
Mk-82 (500 # Bombs) (3)	96 Bombs	546 Bombs
Mk-83 (1,000 # Bombs) (4)	48 Bombs	224 Bombs
Bombs/7 Days (Mk-82/Mk-83)	672/336 Bombs	3822/1568 Bombs

Source: Created by Author.

(1) Fully Mission Capable Rate of 90%; Desert Storm data from interviews.

(2) Carrier Air Wing cycle during Desert Storm for *USS Roosevelt* (CVN-71)

(3) Mk-82 loading of 4 bombs per AV-8B; 10 bombs per A-6E; 6 bombs per FA-18.

(4) Mk-83 loading of 2 bombs per AV-8B; 6 bombs per A-6E; 3 bombs per FA-18.

Note: Mission load out of aircraft data comes from oral interviews with AV-8B, A-6E, and FA-18 pilots who flew combat missions in Desert Storm. Both the A-6E and the FA-18 are capable of carrying more bombs per aircraft; Mk-83 load is maximum for AV-8B for takeoff from amphibious ship.

amphibious ship increases its load out of Harriers to the maximum, the ability to insert Marines ashore by helicopters is then impaired correspondingly.

The amphibious force lacks airborne early warning and electronic jamming assets that are part of the air wing complement for a carrier. Without the ability to detect and target via air-to-air radar, the Harrier is currently vulnerable to enemy fighters. Although the AV-8B will possibly be retrofitted with its own air-to-air radar similar to the FA-18, it currently has only an air-to-ground radar capability, which does not allow the provision to carry a long-range air-to-air missile for defense against fighters.⁴²

DISTRIBUTION OF AMPHIBIOUS RESPONSES OVER TIME

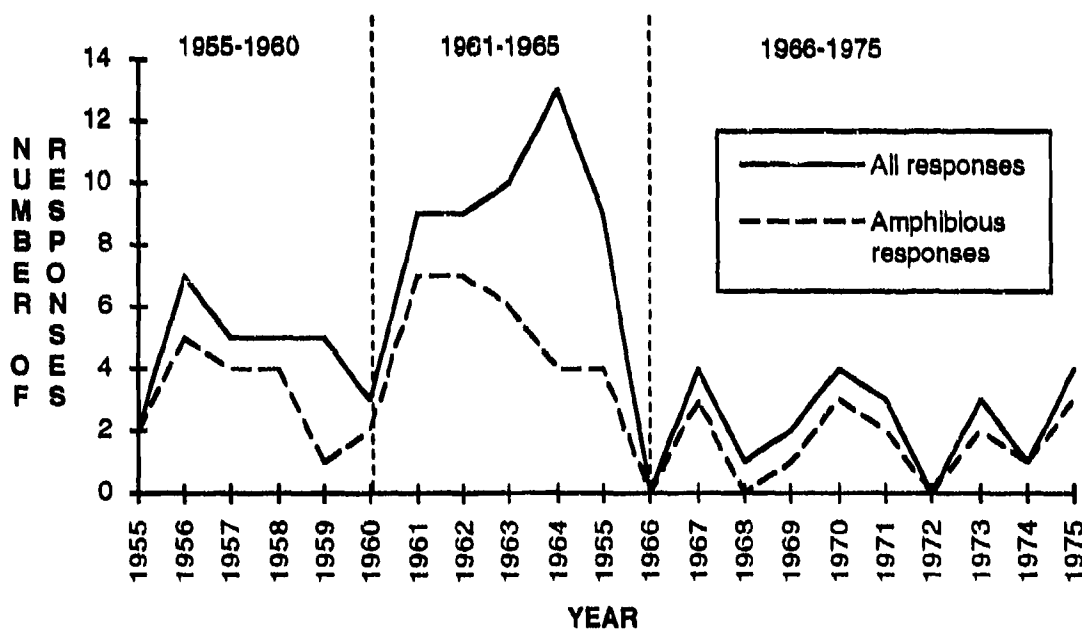


Figure 11.

⁴² Telephone conversation with OP-743; Amphibious Requirements Branch, Washington DC, 3 February 1992.

Source: Mahoney, Robert, "U.S. Navy Responses to International Incidents and Crises, 1955 to 1975, Survey of Navy Crisis Operations," Center for Naval Analyses, CRC 322 Vol. I, July 1977, p. 27.

Finally, the AV-8B is only capable of performing missions that are less than one-half the mission radius of the A-6E and two-thirds the radius of the FA-18 if all aircraft operate without airborne refueling. Since the AV-8B has never been certified to receive fuel from the KC-135 tanker, it is restricted to certain types of airborne refueling assets.⁴³

Although the ARG with its complement of Harrier aircraft represents a tremendous self-contained capability to perform a wide array of missions, amphibious ships are not optimized to perform repeated strikes to littoral areas in the presence of a credible fighter threat. As Figure 11 above illustrates, amphibious forces have been continually been called upon for crisis response. Quite often amphibious forces constitute the only appropriate force for missions such as the evacuation of personnel from an area. The fact that very few nations possess a seagoing VSTOL capability of the caliber found in the U.S. amphibious forces make it a very potent threat in the maritime environment. For purposes of stability operations, crisis response, forcible entry and simply an overseas "presence," the ARG is an ideal option and could be used in lieu of a carrier.

⁴³ Interview with Major Henry J. Coble, USMC, AV-8B pilot Desert Storm, Naval War College, Newport, RI, 12 December 1991.

CHAPTER V

CARRIER AVIATION'S FUTURE DILEMMAS AND OPTIONS.

The axe was predicted to fall on the Navy budget, as with the other services, when President Bush unveiled his proposal for the Fiscal '93 budget in his January 1992 State of the Union address. An expected announcement that the Navy would be forced to pare down to 9 or 10 deployable carriers would have surprised no one, and would have been consistent with reductions in the Army and Air Force. Although Naval leadership held firm with a "party-line" commitment of 12 carriers, very few staff officers working the new budget believed that a dozen carriers was realistically affordable. Having committed to hold firm at 12 carriers, it would not be the fault of those running the Navy that the base force structure would be significantly altered to the detriment of the service. Yet to the surprise (and dismay) of many, the Administration spared further cuts to the carrier force, citing its use as pivotal in accomplishing forward presence and crisis response. Not only was the carrier force to be maintained at a total of 12 deployable carriers with 12 active air wings, but an additional nuclear carrier for use in the distant future, CVN-76, was included in the President's FY '93 budget for long-lead money to begin construction in 1995. Instead of slashing the carrier fleet, the Seawolf submarine became the prime target for saving money. As was expected, the Department of the Navy (DON) budget was reduced \$7.9 billion from what was previously requested for a total of \$84.6 billion (President's budget proposal) with the presentiment that another ten percent could vanish before the process ended.⁴⁴ As a result, budget analysts will undoubtedly work

⁴⁴ David A. Bond, "US Defense Budget Cuts to Curb Acquisition of New Weapon Systems," Aviation Week & Space Technology, 3 February 1992, pp. 20-21.

feverishly to determine how the Navy will accomplish tasking that is essentially unchanged from previous years, with 461 total ships, nearly the same number of personnel (a two percent decrease) and drastically less money compared with 1991 (\$101 billion in FY '91). Harlan Ullman's model (Table 1) for contrasting budgets against force size approximates the dilemma the Navy currently faces while it tries to pay for more than is realistically affordable. As the Navy is discovering, 12 carriers and 13 air wings will be an extreme challenge to fund with an annual budget of roughly \$85 billion, that is in all probability on the high side of future budgets.

Table 3. Approximate combat force levels for a given budget.

Navy Budget (FY 91 \$)	Nominal CVBG	Amphibious ships	Submarines (SSN/Trident)	Surface Combatants	Total Ships
\$45 billion	4-5	10-15	40-45	55-60	250
\$55 billion	5-6	25-30	45-50	65-70	300
\$65 billion	7-8	25-30	55-60	75-80	350
\$75 billion	8-9	40-45	60-65	90-95	425
\$85 billion	10-11	40-45	65-70	110-115	480

Source: Harlan K. Ullman, In Harm's Way, Bartelby Press, 1991, p.160.

Accomplishing the fiscally impossible will occupy the time and talent of many individuals. The scramble to shuffle dollars between programs will be akin to "rearranging deck furniture on the Titanic," for regardless of appearance, the course for collision will not have been altered significantly while attempting to pay for more than is affordable. Since the Navy's near-term reduction in personnel is relatively insignificant (19,500 personnel in FY '92), and deployable assets are only slightly fewer than the previous year (464

deployable ships in FY '92 compared to 461 in FY '93), cost reductions must be found from some source without delay.⁴⁵ Since readiness and training are intrinsically tied to the morale of personnel, it is unlikely that the underlying operation and support funds will be candidates for reduction. The real question is, what program(s) will fall victim to the reality of fewer dollars without creating the dreaded "hollow force"?

Peripheral programs within Naval Aviation which, although not costly individually, collectively create an attractive temptation for needed cuts, are traditionally the first to go. Programs such as advanced weaponry and training ordnance are "quick fixes" that are targeted to ease the initial crunch, for they can be terminated relatively rapidly without the impact of cancellation of a major program. A prime example was the recent curtailment of the Advanced Air-to-Air Missile (AAAM), which would have better enabled the FA-18 E/F to substitute for the F-14 in the outer air battle mission. The AAAM, a missile that was not a joint program with the Air Force, was terminated as a cost-saving measure, yet the FA-18 E/F program is still proceeding as planned without this major component which is critical to the future employment of the aircraft. As shortfalls of a few billion dollars here or there are patched together from a variety of smaller programs, the net effect is that training or war-waging capabilities are lost in the future. The attempt to avoid a "hollow force" is not avoided at all - it is in fact *created* with such an approach. Cutting advances in weaponry and training ordnance for aircrew is merely the tip of the iceberg of funding shortfalls. The major obstacle to be overcome in the coming decade will be fielding enough

⁴⁵ Ibid., p. 22.

properly outfitted and competently manned aircraft to fill the decks of the dozen deployable carriers.

The Aircraft to Carrier Disconnect...

The prime example of a disconnect between ends and means exists in the Navy's ability to procure enough aircraft to fill its current 12 active carrier air wings (later to be reduced to 11 active and 2 reserve air wings). Simply stated, the Navy procured the bulk of its current aircraft during the 1980's. Since most carrier aircraft have a life span of about 20 years, a large number of aircraft will meet the end of their useful lives in the mid to late 1990's. It has been estimated that 5,000 aircraft will need replacement Navy-wide over the next 20 years due to aging.⁴⁶ In order to fulfill the needs of a set number of air wings, the Navy must procure a certain number of aircraft per year. This figure is predicated on aircraft age and estimated losses that occur through accidents each year. The future challenge will be to fill 12 deployable carriers with sufficient aircraft. The Fiscal '93 budget has earmarked \$6.7 billion for procurement of 127 Navy and Marine aircraft, not all of which are carrier-bound. It is estimated that 210 aircraft are needed service-wide to meet total projected needs. This same dilemma has already occurred over the last few years where procurement was only about half of what was needed to fulfill future requirements.⁴⁷ The following charts (Figures 12, 13, and 14) illustrate the requirement for 11 active and 2 reserve air wings or the equivalent of 13 wings' worth of A-6E, F-14 and FA-18 aircraft respectively.

⁴⁶ Robert Holzer, "Navy Struggles to Find Funding For Ailing Aviation," Defense News, 25 March 1991, p.60.

⁴⁷ Bond, "US Defense Budget Cuts," p. 20.

A-6/AX INVENTORY vs. REQUIREMENTS

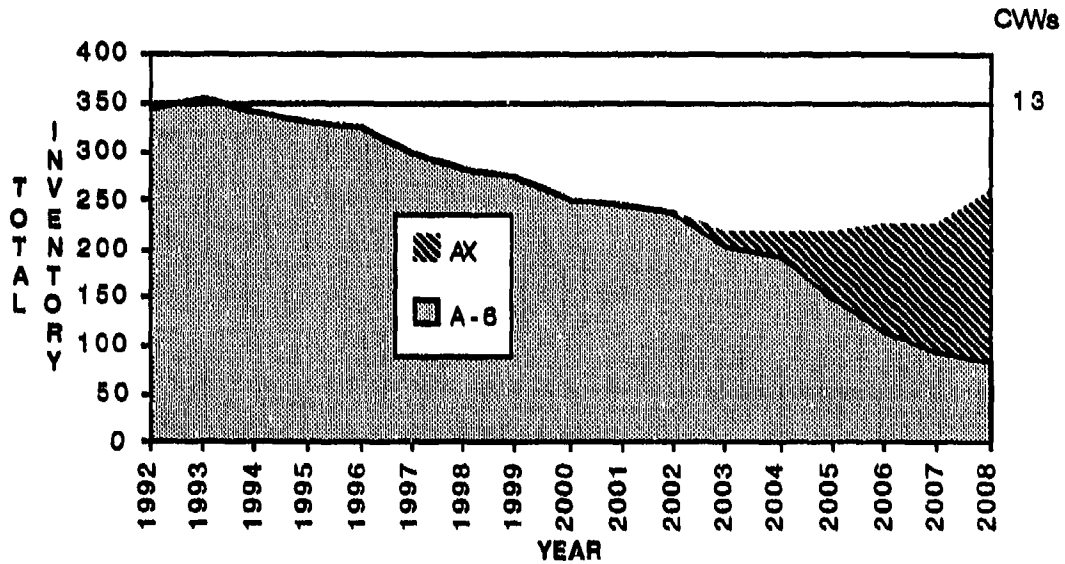


Figure 12.

F-14 INVENTORY vs. REQUIREMENTS

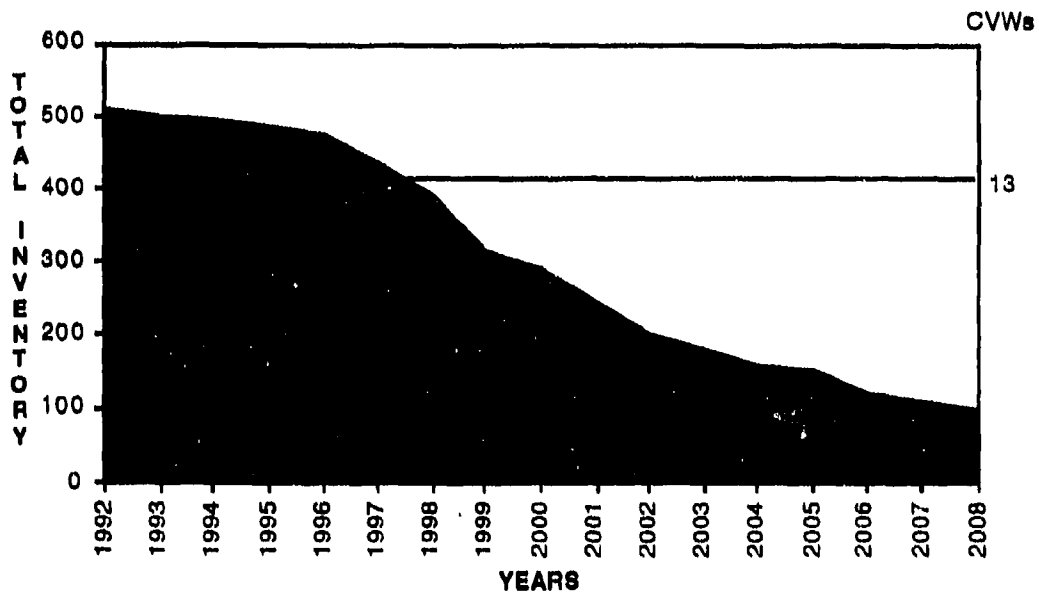


Figure 13.

USN/USMC F/A-18 INVENTORY vs. REQUIREMENTS

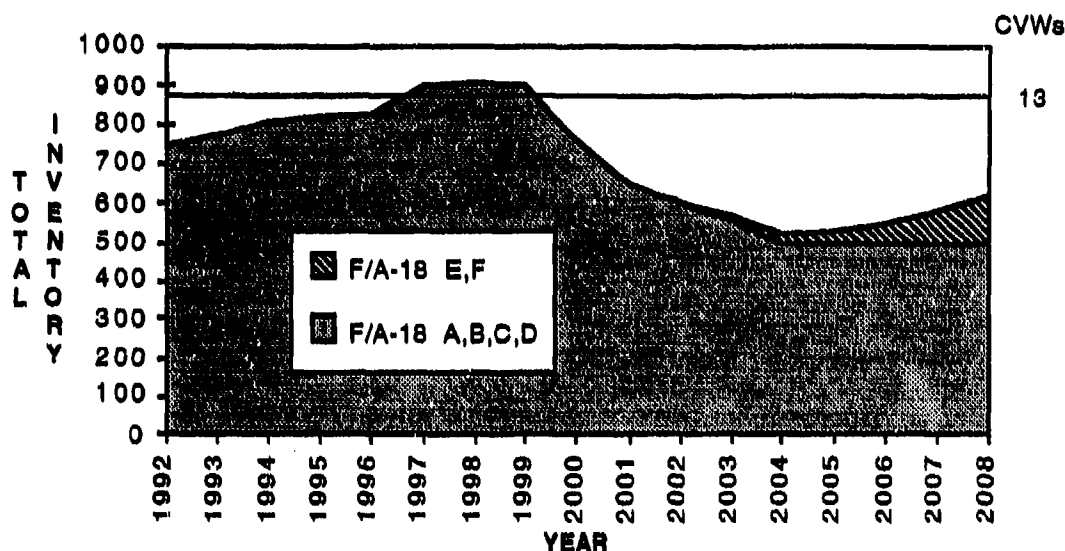


Figure 14.

It is obvious the downward trend of each type of aircraft clearly demonstrates the dramatic void that will exist if funding of aircraft procurement does not change. Figure 15 shows the cumulative effect of aircraft shortages for future years.

Does Naval Aviation merit additional funding? Has it received its fair share to fill carrier decks in the future or is there a disconnect somewhere in the aircraft procurement process? The Assistant Chief of Naval Operations, Vice Admiral Richard M. Dunleavy recently stated,

"The truth is that naval aviation has received its fair share for the past five years at least (87-91), and -as far ahead as the budget is currently projected in the FYDP- receives more than either the submarine or surface community...it is hard to justify naval aviation getting an even larger slice of the pie."⁴⁸

⁴⁸ Richard M. Dunleavy, "Myths vs. Facts," U.S. Naval Institute Proceedings, February 1992, p. 70.

NAVY/USMC FIGHTER & ATTACK AIRCRAFT

11 Active/2 Reserve CVWs & USMC

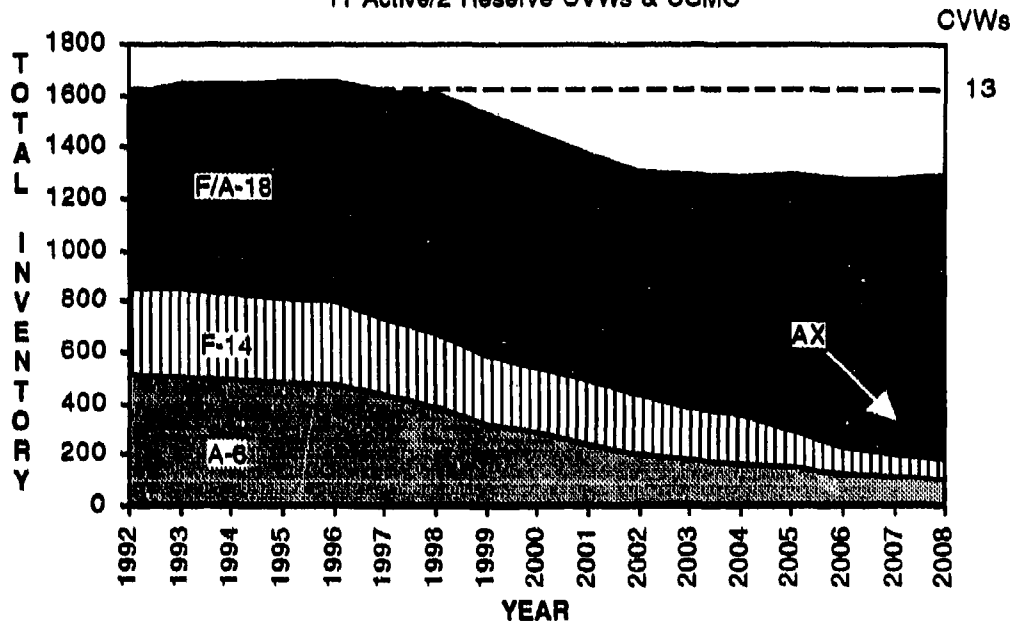


Figure 15.

Source, Figures 12-15: OP-05, 1991 estimates of aircraft requirements.

A look into the future shows the aircraft procurement account averages over nine percent between 1993 and 1997, a figure that most likely will not climb significantly.⁴⁹ If decreased funding trends continue, as it appears they will, the number of deployable carriers will not be the main issue for the Navy, but instead whether sufficient aircraft will *be available* to fill their decks. Under these circumstances, it is imperative to focus not on past funding levels, but how the money *was* spent and how *should* it be spent in future years.

⁴⁹ Department of the Navy, FY 1993 President's Budget Appropriation Summary, 7 Jan 1992.

Aircraft Modernization: A Decade of Frustration.

The Navy has already altered a significant number of its plans, some voluntarily and others involuntarily, in order to save money. Yet in spite of Naval Aviation's attempt to modernize in nearly every mission area over the last decade, not a single new fixed-wing fleet aircraft is flying after billions of dollars were devoted to a host of new or modified programs. Some of the programs that have gone by the wayside include: the A-12 Avenger, a replacement for the 25-year-old A-6E, terminated as a result of contract mismanagement and cost overruns; the Naval Advanced Tactical Fighter (NATF), which was the follow-on fighter to the F-14; the Advanced Tactical Support Aircraft (ATS), successor to the E-2, EA-6B and S-3; and finally the P-7, an advanced anti-submarine aircraft intended to replace the P-3.

Attempts were made to upgrade the F-14 and A-6 through the F-14D and advanced A-6F medium attack aircraft. In the case of the F-14D, a decision was rendered to build 18 new aircraft and remanufacture 37 older F-14's for a total of only 55 upgraded F-14Ds, as a result of the high unit aircraft cost.⁵⁰ In the case of the A-6F, the program was scrapped in favor of rewinging and reworking current A-6E's as a less costly way to extend the life of the A-6E and add system improvements to the aircraft. The only aircraft to achieve a fully developed prototype is the Marine Corps tiltrotor V-22 Osprey, the replacement for the CH-46 medium lift helicopter. Despite the Navy's fervent efforts to terminate the highly controversial Osprey program, this expensive aircraft continues to receive congressional support for more prototypes.⁵¹

⁵⁰ John D. Morrocco, "Navy to Upgrade F/A-18s, Rewing Additional A-6s," Aviation Week & Space Technology, 11 February 1991, p. 83. More detailed information obtained via telephone interview with John C. Leslie, Grumman Aerospace Corporation Test Pilot, on 25 February 1992.

⁵¹ Bond, "US Defense Budget Cuts," p. 22.

Essentially, after billions of dollars have been spent on the research and development of new tactical aircraft for the Navy, none have been procured since the FA-18, which was designed in 1975 and procured in 1979. It is estimated that Naval Aviation has lost nearly \$40 billion from future budgets as a result of the termination of a variety of aircraft programs. This loss alone is estimated to be the equivalent of 900 aircraft from the planned acquisition of 1500 aircraft through 1996.⁵² As 1992 begins, carrier aircraft modernization rests solely on two remaining programs: the AX, the replacement for the A-6E medium attack aircraft, and the FA-18E/F, an advanced version of the current FA-18.

AX - Is the Silver Bullet Affordable and Necessary in the Near Future?

The Gulf War demonstrated that although the F-117 comprised only 3 percent of all Air Force planes in the region, the effect that 42 aircraft had on destroying nearly 40 percent of the designated "strategic" targets left most defense analysts with the impression that stealth was worth the investment.⁵³ The effectiveness of stealth aircraft in striking targets in the most heavily defended areas is undeniable; exactly how many stealthy platforms are necessary is open to interpretation when a mere 42 aircraft had such a dramatic impact.

In its quest to acquire a long-range stealthy bomber, the Navy developed the A-12 Avenger program. Shrouded in secrecy, the A-12 was ultimately terminated by Defense Secretary Cheney for a myriad of reasons. Ultimately, the Navy was left with nothing after billions were invested in research and development. By April 1991, the Navy, still seeking to find a

⁵² Holzer, p.1 .

⁵³ Bert H. Cooper, Jr. AX Aircraft Program: Issues and Options, Congressional Research Service, IB91104, (Alexandria, VA: 15 November 1991), p. 8.

medium attack replacement for the A-6E, adopted a novel approach to the same problem and renamed this futuristic aircraft the AX. The new aircraft would have less range and carry less ordnance than the A-12, be stealthy through low observable engineering and in all probability cost more than the Avenger by virtue of its later conception and procurement. Whether or not the AX would serve as a fighter in addition to its strike role has been debatable. In the quest for more multi-role aircraft, there is a strong consensus that the AX should be capable of performing both strike and fighter missions. Design engineers have pointed out that the multi-mission flexibility is well within the realm of design with the predictable consequence that the aircraft will be considerably more expensive.⁵⁴

The cost incurred in the development and procurement of the AX runs concurrently with the development of the FA-18 E/F. Whether touted as a single-mission aircraft or supersonic strike-fighter, the AX is an extremely expensive "paper aircraft" at a time when funding competition has reached an unprecedented level. Research and development (R&D) alone has been estimated at \$13 billion in the House Appropriations Committee report on FY 1992 defense appropriations.⁵⁵ Other Pentagon sources claim the AX could very likely cost \$16 to \$18 billion in R&D expenses alone.⁵⁶ In May of 1991, Navy officials estimated that the entire cost of development and procurement for 575 AX aircraft would be \$86.3 billion dollars in FY '91 dollars.⁵⁷ The unit cost per aircraft was originally estimated at \$100 million apiece at the high rate of production and \$160 million apiece if a lower rate of

⁵⁴ John D. Morrocco, "Senior Navy Officials Doubt AX Adaptable to Multirole Capability," Aviation Week & Space Technology, 13 May 1991, p. 25.

⁵⁵ Cooper, p. 3.

⁵⁶ Interviews conducted by author 16-17 December 1991 with various Pentagon sources familiar with AX program.

⁵⁷ Cooper, p. 3.

production was selected.⁵⁸ Adjusted for inflation, the entire AX program cost could well exceed the Navy's budget for one entire year if procurement of so many aircraft is attempted. Is the added capability worth the expense? Moreover, are so many stealthy aircraft required?

Before the advent of anti-radiation missiles, cruise missiles and the B-2 bomber, a vehicle like the AX could have been justifiably required to more effectively accomplish retaliatory strike missions such as those flown into Libya and Syria. Since both the B-2 and Tomahawk missile capabilities now already exist in varying degrees and the AX does not, for future missions of a limited scope it is logical to employ such weapons for high-risk targets.

The continued use of carrier aircraft against targets with lower associated risk remains a viable option. As long as the U.S. persists in maintaining a technological edge over third-world defenses through electronic jamming, high-speed radiation missiles and stand-off attack weapons, there is no "apparent" urgency to procure a weapon system that will draw from so many other pressing needs. While the AX represents the wave of the future where stealth is required for survivability, the necessity for large numbers of stealthy aircraft is not immediate in view of potential adversary advances. Research and development efforts should continue to a limited degree and the program paced in accord with a more distant emerging threat. Already, funding for AX research and development has been halved for the next five years, which will most likely delay fleet introduction to the year 2010 if not later.

In light of the limited number of B-2 aircraft that are to be procured, the AX could very well serve both the Navy and the Air Force as a joint venture

⁵⁸ John D. Morrocco, "Navy Officials Debate Service's Ability to Fund AX, Other Aircraft Needs," Aviation Week & Space Technology, 13 January 1992, p. 26.

aircraft if the two services were to agree on aircraft requirements. As a replacement for the F-111, F-15E and F-16 aircraft, the Air Force realizes the benefits of a joint program to fulfill the needs of both services.⁵⁹ Historically, the F-4 Phantom and the A-7 Corsair aircraft met the requirements of both services, each with slight modifications to accommodate specific service needs. Since economies of scale are only reached when a large number of aircraft are procured, the production run on a joint-service aircraft would ideally suit both services in fulfilling the need for a stealthy bomber with some inherent fighter capabilities. Independently, neither service will have the funding to acquire such an aircraft. The F-117 proved in the Gulf War that very few aircraft could have a dramatic impact in prosecuting the most challenging targets. In the Navy's quest to replace the A-6E Intruder it should be realized that a one-for-one replacement is not required for the A-6E if the follow-on aircraft will accomplish missions more effectively with fewer aircraft. Pursuit of the AX should be planned primarily as a modernization effort as opposed to a medium attack aircraft replacement program. In turn, much less than 575 aircraft are needed to meet future requirements since the capabilities of the AX will far exceed the 1980's technology incorporated into the F-117.

In the Navy's case, acquiring the AX in the near future would be analogous to putting an addition on a home that already has a gaping hole in the roof; the new addition would be nice to have but fixing the roof with the limited funds available is a much more pressing need. Filling the decks of existing carriers is the Navy's "hole in the roof;" it needs fixing, is not improving on its own and will probably cost more to repair than originally

⁵⁹ David A. Fulghum, "USAF Chief McPeak Sees A-X as Priority As Service Debates A-X, MRF Acquisition," Aviation Week & Space Technology, 10 February 1992, p. 25.

estimated by the contractor. If Naval Aviation is to remain a vibrant force, sound investment decisions must be made in the near term which result in aircraft procurement that is in concert with the other pressing needs of the naval service.

FA-18 E/F: Filling the Gap in the Charts.

As a means to increase the number of strike aircraft on each carrier, upgrades to the F-14 were considered which would have expanded its mission to include a strike role, but ultimately rejected in favor of upgraded versions of the FA-18 (the FA-18E/F). It was felt that the need to fill the future gap could best be accomplished with upgrades to the Hornet whose inherent mission flexibility, systems growth potential and increased range over its predecessors (FA-18 A/B/C/D) would make it a viable alternative in the twenty-first century. Although the FA-18E/F will not have the range of an A-6E (or the AX, for that matter) nor some of the outer air battle attributes of the F-14, it will be able to perform a variety of missions beyond the capabilities of either the A-6E or F-14. Since the FA-18 E/F is not a markedly different aircraft than previous versions, the program has much less associated risk in comparison to the A-12 or AX.

With a concentrated effort and enough dollars, there is little doubt that the FA-18 E/F is an executable program. Analysts familiar with budgetary requirements and limitations point out that a 25 percent fleet reduction in ships and aircraft carriers would provide adequate fiscal relief to bring both the AX and FA-18 E/F programs to fruition in the future.⁶⁰ In February 1992, a Pentagon source revealed that the low rate initial production of the FA-18

⁶⁰ Ronald O'Rourke, "Budget May Force US Navy to Choose Between New F/A-18, AX," Defense News, 6 January 1992, p. 19.

E/F would run nearly \$180 million per aircraft for the first 12 aircraft, which was \$110 million *more* per aircraft than had been previously anticipated. This \$1.3 billion overrun will undoubtedly be recovered from various programs already earmarked to receive money in the previous budget.⁶¹

If the AX and FA-18 E/F are to lead the way for modernization efforts of Naval Aviation in the twenty-first century, they are both on a collision course with the cost of maintaining a capable and ready fleet of 450 ships. The ability to project highly accurate weaponry worldwide from a stealthy platform will be nothing more than an idle wish if drastic sweeping reforms are not enacted. A dimension of striking power never before realized is technologically feasible and available if innovative fundamental changes are undertaken in the 1990's. If the carrier force is to be the focal point of Naval power, there are some practical measures by which to accomplish much needed aircraft modernization within new budget constraints and remain a viable tool of national defense.

Future Aircraft are the Catalyst...

The most immediate and obvious solution to resolve the shortfalls in aircraft inventories would be a reduction in the number of operational air wings. Had the number of deployable carriers been reduced in the 1993 budget, a corresponding reduction in the number of air wings would have followed. Currently, the depth of modernization and procurement that is needed with 12 carriers and either 11 or 12 active air wings cannot be accomplished concurrent with efforts to maintain the *status quo* force structure. A naval force of diminished capability will inevitably result if additional funds are not

⁶¹ Telephone conversation with undisclosed Pentagon source, 12 February 1992.

allocated to the Navy *or* further cuts to the present structure become necessary in order to preserve modernization and aircraft procurement efforts. What specific effects would fewer air wings have on the Navy?

- Aircraft procurement could be realigned to realistically meet future requirements.⁶² Previously earmarked procurement funds could instead be redirected to accelerate R&D modernization efforts. Even with optimal utilization of available dollars, the longer procurement and/or R&D programs are extended, the more costly they will become due to inflation.

- Increasing the number of strike-capable aircraft per carrier from 40 to 60 would be a much more feasible goal with fewer air wings.

- Aircraft predicted to be in critical shortages in the coming years could be placed into preservation in the near term for use at a later date, a concept already operative because of the foreseeable acute shortage of E-2C Hawkeye aircraft. Fewer air wings would create an excess of aircraft in the near term that could essentially be mothballed, in turn extending the grace period while gains in replacement aircraft are actualized.

- Reductions in personnel consistent with fewer carriers and air wings could save billions of dollars over the long term since personnel costs comprise nearly one-third of the annual DON budget.⁶³ Additionally, the much-needed training ordnance and stand-off weapons that would otherwise be subject to cancellation may be preserved.

- Efforts to develop the Advanced Tactical Support aircraft could possibly be resurrected to meet vital tactical support needs which are currently being neglected as a result of underfunding.

⁶² U.S. Navy Dept., "TACAIR Power Projection Requirements," OP-505H, Washington DC, February 1992.

⁶³ U.S. Dept. of Defense, "FY 1993 President's Budget."

- Fewer air wings on a reduced number of deployable carriers means fewer support ship requirements and, in turn, a smaller supporting infrastructure.

With fewer air wings and corresponding aircraft carriers, a portion of the national strategy would arguably suffer as a result of diminished forward presence. Are carriers the pivotal focus of forward presence, or has a certain amount of myth and outdated tradition clouded the actual need for continual deployment of a specific number of carriers over time? How, then, is forward presence most effectively accomplished?

CHAPTER VI

RETHINKING DEPLOYMENT PHILOSOPHY

Armed forces can serve as an effective means of achieving foreign policy objectives through their potential, rather than actual, use. The idea that the judicious use of armed forces can possibly delay unfavorable developments and thereby provide a window of opportunity for diplomacy in crisis resolution influences the deployment of forces, in particular naval forces. Since the mid-1970's, deployment patterns of carrier battle groups on a continual basis world-wide has become an established naval practice. Specifically, the Commanders-in-Chief (CINCs) of the various world areas of responsibility (AOR) have operated without fiscal accountability for years by placing demands on the Navy's carrier forces that are financially unwieldy for the service to fund. Since the CINC's job is to be prepared for any contingency in his AOR, the requirement for continual carrier coverage has traditionally been a convenient method of preparing for any crisis that might arise, whether actual employment is envisioned or not. Of course the Navy is charged with paying for the service provided. The Indian Ocean has received the most attention with a continual commitment of one carrier on station since the cessation of hostilities in the Gulf. Elsewhere, fluctuating numbers of carrier battle groups have been sent to "deployment hubs" (Figure 16) worldwide to fulfill the role of forward presence.

U.S. NAVAL FORCES "DEPLOYMENT HUBS"

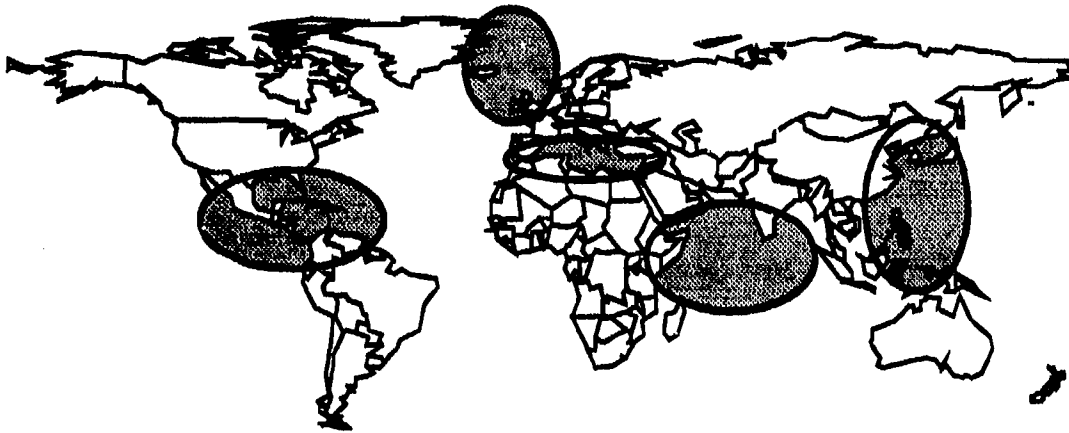


Figure 16.

Source: "America's Carrier Battle Groups: Lasting Requirements in a Period of Global Change," ACNO Air Warfare 3-91.

Since 1980, the Navy has attempted, with varying degrees of success, to keep at least one carrier deployed to the three dominant "deployment hubs," the Mediterranean, Western Pacific and Indian Ocean.⁶⁴ Studies often cite the number of annual carrier days spent in various parts of the world (Figure 17). Nevertheless, as convincing as such figures might be, the bottom line is that even with 15 deployable carriers, as the Navy had in 1990, all "deployment hubs" are not served continuously. For example, in reality most carriers merely transit the Western Pacific enroute to the Indian Ocean, or, as in the case of the carrier *Independence*, are credited with days in that region while tied up in their home port. Although the North Atlantic is depicted as an acknowledged "deployment hub" and many war plans formerly centered around a potential confrontation with the Soviet Union in those waters, in actuality carriers have deployed to the North Atlantic for an average of 28

⁶⁴ Ronald O'Rourke, "Aircraft Carrier Force Levels and Deployment Patterns: Issues and Options," CRS Report to Congress, Washington DC: The Library of Congress, June 28, 1991, p. 1.

days per year between 1976 and 1988. In some years the total number of North Atlantic carrier-days was less than ten. Likewise in the South Atlantic, carriers have deployed an average of 4 days per year during the same period.⁶⁵

ANNUAL CARRIER SHIP DAYS DEPLOYED

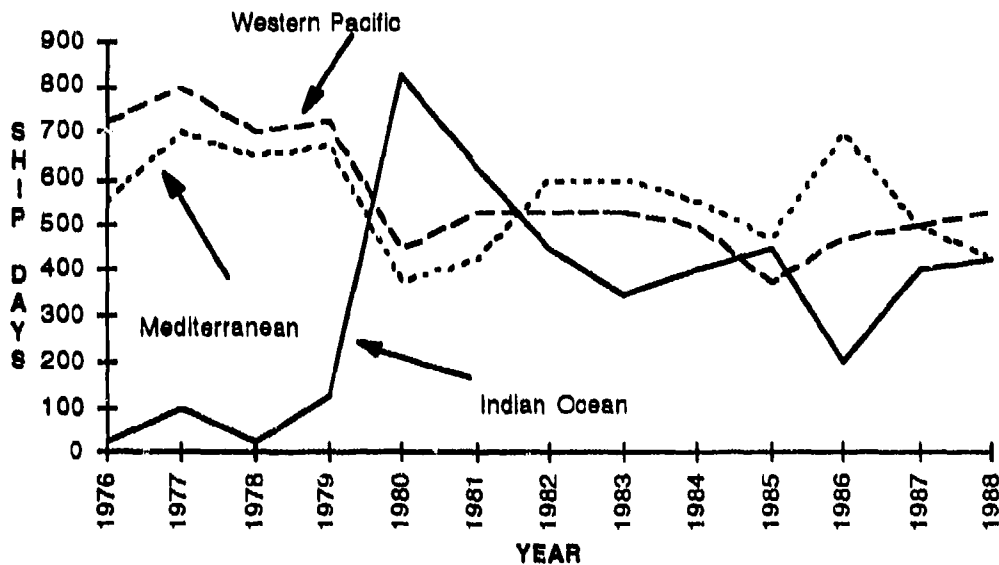


Figure 17.

Source: Siegel, Domabyl, Lingberg, "Deployments of U.S. Navy Aircraft Carriers and Other Surface Ships, 1976-1988," Center for Naval Analyses, CIM 51, July 1989, p.11.

Congressional analyst Ron O'Rourke demonstrates very accurately with some simple mathematics that more than 14 carriers are required to maintain a continual presence in the three dominant "deployment hubs."⁶⁶ Factors in his calculations include:

⁶⁵ Adam Siegel, et al., "Deployments of US Navy Aircraft Carriers and other Surface Ships 1976-1988," CIM 51, Center for Naval Analyses, July 1989, p. 19.

⁶⁶ O'Rourke, "Carrier Force Levels" pp. 3-6. (Specific details of his calculations are reproduced in Appendix I.)

1. Carrier transit distances to the three "deployment hubs."
2. Typical carrier overhaul scheduling.
3. Allowances for the Navy's personnel tempo (pers tempo) policy of two days home for each day spent on deployment.
4. The effect that forward basing an aircraft carrier in Japan has on deployments to the Western Pacific and Indian Ocean.

With the decision to reduce the force structure to 12 deployable carriers, it is a moot point that the Navy can no longer provide constant forward deployment to all three traditional "hubs." The Navy is just beginning to discover the constraints of operating fewer carriers. A case in point is the recent replacement of the carrier *Saratoga* with the *Eisenhower* for a 20-day exercise in the North Atlantic, in an effort to save roughly \$10 million dollars as a result of using the *Eisenhower* on her return from a 5-month Mediterranean deployment versus deploying the *Saratoga* from the east coast. In this way, one carrier will accomplish what has traditionally been done with two carriers.⁶⁷ The Navy has found that even at the zenith of carrier force levels, it has been unable to defend portions of all three oceans simultaneously. A regional conflict such as the Gulf War clearly demonstrated that a six-carrier commitment in one region (Persian Gulf and Red Sea) may well be as large a commitment that is operationally feasible. Assessment of the purpose and influence of forward presence in the absence of the former Soviet threat prompts re-evaluation of traditional naval deployment cycles and destinations.

Redefining the Deployment Agenda

A critical purpose in the forward deployment of aircraft carriers is to "signal" U.S. intent to both allies and potential adversaries. Although aircraft carriers have been deployed worldwide continuously for 45 years, their influence in

⁶⁷ John Burlage, "Showing What a Smaller Navy Can Do," *Navy Times*, 24 February 1992, p. 8.

crisis resolution has been subject to debate. The hackneyed expression, "When a crisis occurs the President always asks, 'Where are the carriers?'" might more accurately be phrased, "If a carrier was there, would it have made a difference?" More often than not, the presence of a single carrier has not significantly averted nor aggravated a potential crisis. Acts of terrorism and anarchy are events that probably have not been impacted appreciably affected by an aircraft carrier's presence or absence. The littoral reaches of the Mediterranean is a prime example of an unstable region where either one or two aircraft carriers have been deployed constantly for decades. Very few crises which arose in the Mediterranean since 1974 were immediately resolved or avoided due to the presence of an aircraft carrier. The lone exception was the *Achille Lauro* crisis which, in all likelihood, could not have been resolved without carrier air power in the immediate vicinity (Refer to Table 1).

A prime example of the misapplication of naval power was the attempt to resolve the Iranian hostage crisis of 1979-80 through the continual presence of two carrier battlegroups in the vicinity of Iran. As William Hickman accurately points out in his analysis of the Iranian hostage crisis,

"...the naval presence served no useful role in resolution of the hostage crisis. For the most part, the military options presented by the presence had military or political liabilities which reduced their political effectiveness. What is intended to be a demonstration of strength and resolve may be perceived as weakness and indecision."⁶⁸

The most effective utilization of carrier air power as an instrument of influence in recent years may well be against the country of Libya. A long lead-up period prior to a one-time strike quieted the terrorist-sponsor state of

⁶⁸ William F. Hickman, "Did It Really Matter?", Naval War College Review, March-April 1983, pp. 27-30.

Libya for a number of years. As evident from the aforementioned list of crises, carrier presence has primarily been a political tool rather than the decisive factor in crisis resolution in most instances. How, then, can the deployment and projection of diminished carrier air power be optimized to maintain protection of U.S. interests and citizens?

Moving Toward a Strategy of Decreased Deployment.

As has been shown, the vast majority of crises are not resolved rapidly. Although intelligence communities will rarely pinpoint the location and timing of crises, most do not necessitate an immediate carrier air power response. In many instances, such as the recent unrest in Yugoslavia, it is often in the best interests of the U.S. to assume a neutral role until an intermediary such as the United Nations is in a position to assist in resolving differences between warring factions. Additionally, potential crises are no longer complicated by underlying Soviet opportunism.

Naval forces in general, and aircraft carriers in particular, must be re-evaluated in terms of their value as a reflection of American resolve and confidence abroad. Since aircraft carriers possess an intrinsic worth in their capacity to "show the flag" and instill confidence in allied nations, an isolationist reversion to keeping naval force close to American shores is an unpalatable mindset if American interests are to be preserved overseas. On the other hand, the notion of U.S. naval forces simply constituting a part of the Mediterranean or Indian Ocean "seascape" and manifesting a policy of nonintervention in other nations' affairs was a prevalent attitude prior to U.S. involvement in the Gulf War. As James Cable notes in his book, *Gunboat Diplomacy*, "Limited naval force is most economically implied when

the mere threat achieves the objective."⁶⁹ The precedent of use of force may very well fade from the memories of hostile nations as time elapses since the Gulf War. What impact, then, might "decreased deployment" have on the strategy of forward deployment?

The concept of "decreased deployment," or reduction in the amount of traditional deployment activity, would have a myriad of positive implications on both the U.S. and nations abroad, to include the following:

- "Decreased deployment" would create tremendous savings since fewer carriers and air wings would be needed. Studies show the annual operating and maintenance cost of a Carrier Battle Group (CVBG) is \$586 million per year while deployed for a six-month period. Interestingly enough, savings of only 10 percent are realized when a CVBG does not deploy at all during a year. Only when a CVBG does not exist do substantial savings occur.⁷⁰

- With fewer demands on it, Naval Aviation could commit the requisite time and money to development of next-generation aircraft designed to achieve higher mission success.

- When a crisis occurs, carrier forces would be employed as they originally were under the scheme of constant deployment. However, instead of responding immediately to every crisis, the U.S. could selectively "signal" potential adversaries that the situation was serious enough to warrant carrier presence. Selective crisis response in matters of paramount concern to the U.S. evokes a clear message of substance and credibility. Conversely, when a carrier steams a short distance to arrive at a crisis because nothing else is

⁶⁹James Cable, Gunboat Diplomacy (New York: St. Martin's Press, 1981), p. 26.

⁷⁰Henry L. Eskew "Carrier Battle Group Costs Under Alternative Operational Scenarios," Center for Naval Analyses, CRM-155, September 1990, p. 3.

going on and with no intent to intervene, the wrong psychological signal is sent.

- "Decreased deployment" which incorporates a scheme of less visible carrier presence may prove to be more conducive to diplomatic solutions than cornering or badgering a nation with carriers that happen to be in the area. The fact that two carriers were already in the Mediterranean during the 1970 Jordanian crisis in all probability had much less of an impact than did the announced movement of a carrier from the Atlantic toward the Mediterranean.

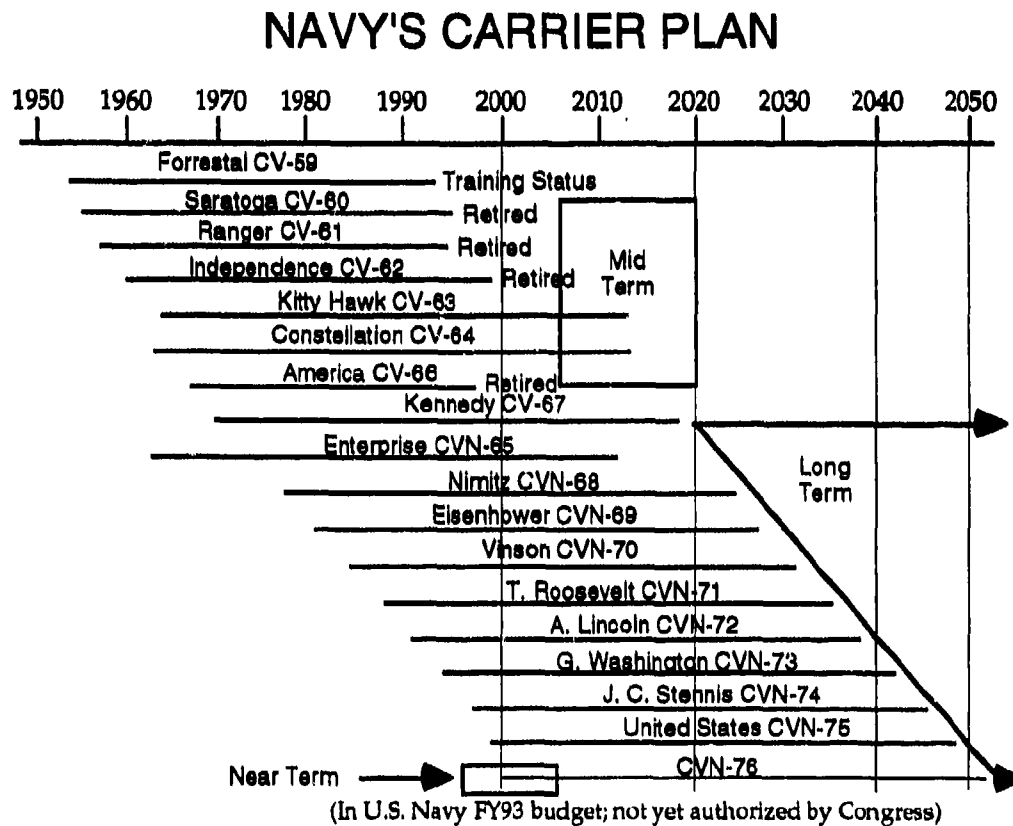
- "Decreased deployment" could ease the constant pressure to meet deployment dates and permit accommodation of more meaningful training both in the U.S. and abroad. If the forward deployed time was cut 25 to 50 percent, depending on transit distances to some theaters, the Navy could be much more flexible in its approach to scheduling commitments with allies. Being in the right place at the right time has always been a shell game of sorts no matter how many carriers the Navy has deployed at any one time. Future crises are likely to be as unpredictable as those in the past. Crisis resolution will probably continue to involve carriers whether they find themselves in the vicinity of a crisis or at some great distance. The true measure of future effectiveness for carrier air power will be the degree to which it is useful as a significant political tool, force augments, vehicle of power projection and/or instrument of sea control.

CHAPTER VII

CARRIER FORCE STRUCTURE OPTIONS

Adoption of "decreased deployment" versus a constant forward presence strategy would require fewer aircraft carriers. Since it has been demonstrated mathematically that a dozen carriers cannot accomplish a constant three-ocean presence without a negative impact upon personnel tempos, "decreased deployment" represents a realistic, attainable alternative.

Table 4a. Current Navy Force Structure Plan



Source: U.S. Navy, Carrier Evolution Plan, Naval Institute Proceedings, January 1992, p. 101.

In the current curtailed budget environment overshadowed by the prospect of future lower funding levels, a plan that incorporates a smaller deployable carrier force will likely become inevitable. The formulation of a new carrier force structure must accommodate a variety of factors. The Navy's plan, shown in Table 3 followed by a transitional plan in Table 4, contrast two approaches to future carrier force structuring.

Table 4b. Transitional Carrier Plan

Current Carrier Force 1-92 TOTAL = 14	Transitional Force TOTAL = 11	Final Force 2000 TOTAL = 10	Reconstitution Force TOTAL = 5
CV-59 (Transition to CVT)	CV-62 •	CV-64 #	CVT-59
CV-60 (Retire)	CV-63	CVN-68	CV-62
CV-61 (Retire)	CV-64	CVN-69	CV-63
CV-62 •	CVN-68	CVN-70	CV-66
CV-63 (Recent SLEP)	CVN-69	CVN-71	CV-67
CV-64 (Recent SLEP)	CVN-70	CVN-72	
CVN-65 (Refuel?)	CVN-71	CVN-73	
CV-66 (Retire)	CVN-72	CVN-74	
CV-67 (Retire)	CVN-73	CVN-75	
CVN-68	CVN-74	CVN-76	
CVN-69	CVN-75	#Replace CV-62 (Japan)	
CVN-70	•Based In Japan		
CVN-71			
CVN-72			

Source: Table Created by Author.

From Fossil Fuel to Nuclear Power

With the ability to rapidly create wind over the deck to land aircraft, steam at high speeds without refueling across vast distances, and operate at a fraction of the operating and maintenance expenses of conventionally-powered carriers, the large-deck nuclear carrier has proven its worth over fossil-fueled aircraft carriers. In the 1960's, it was predicted that a nuclear carrier would have a life span of roughly 30 years and the nuclear fuel would last for about 15 years before needing refueling. Today this same carrier has an expected life span of 45-50 years and a nuclear core life of 23 years.⁷¹ Although fossil-fueled carriers are no longer built, the initial cost of the *Nimitz*-class carrier was 30 percent more than its conventional counterpart because of the nuclear power plant. Because so much is recovered in lower operating and maintenance expenses with a *Nimitz*-class carrier, total life cycle costs of nuclear carriers are nearly identical to conventional carriers after 30 years of operation for both types.⁷² The only exception has been the nuclear carrier *Enterprise*. Construction was begun on the *Enterprise* in early 1958, with commissioning taking place in 1961.⁷³ The only ship of its class, the *Enterprise* could be described as simultaneously unique and antiquated in its engineering design with a total of eight nuclear reactors when compared to the *Nimitz*-class carrier with two reactors. Because of its unusual design, the *Enterprise* requires more personnel than the *Nimitz* in both its reactor and engineering spaces. Between Engineering and the Reactor departments, the *Enterprise* employs a total of 250 more personnel than a *Nimitz*-class carrier.

⁷¹ Telephone conversation with Capt. Fred Vogt, OP-55B Deputy Director Carrier and Air Stations, 11 February 1992.

⁷² John Lehman, *Aircraft Carriers: The Real Choices*, (Georgetown University: Center for Strategic and International Studies, 1978), p. 52.

⁷³ Lawson, Robert L., *The History of US Naval Air Power*, (New York: The Military Press, 1987), p. 141.

Moreover, engineering skills learned on the *Enterprise* are not easily as transferrable to a *Nimitz*-class carrier since the propulsion plant layout on *Enterprise* is unlike any other nuclear carrier. The *Enterprise* has also been notorious for consuming a disproportionate share of ship repair funds. Between 1982 and 1989, the *Enterprise* required 57,000 man-days for repairs as compared to 29,000 for the *Ranger* and 24,000 for the *Vinson*. At an estimated \$500 per hour, this amounts to a cost of \$132 million more to maintain the *Enterprise* than it did *Vinson* over an 8 year period.⁷⁴

Before the announcement of cutback to a 12-ship carrier force, the decision was made to refuel rather than dismantle the *Enterprise*, in turn extending its service life by 20 years.. At a cost of \$2.15 billion, the four-year refueling project is approximately 30 percent complete in early 1992.

Although the combat systems aboard the *Enterprise* are being upgraded, the cost of the project has already exceeded original estimates by \$124 million. With repairs running almost 60 percent of the cost of a new carrier, the *Enterprise* will still be more expensive to maintain than other carriers if its previous record is a reliable indicator of future maintenance costs.

Opponents to scrapping the *Enterprise* argue that since a nuclear carrier has never been dismantled and since estimates to do so are in the vicinity of \$600 million versus \$60 million for a conventional carrier, it is easier to continue overhaul of the power plant as opposed to tackling the problem of dismantlement, (which will eventually have to be done in any event).⁷⁵ This near-sighted approach will undoubtedly cost the Navy over the long run in

⁷⁴ Telephone conversation with Cdr Don Walton USN Ret., Enterprise Overhaul Planner, COMNAVAIRPAC Code 734A, San Diego, CA, 15 January 1992.

⁷⁵ Telephone conversation with Captain George Orr, OP-08D, Washington, DC, 16 December 1991.

maintenance and repair costs for a ship that is a greater burden fiscally than it is worth operationally.

The luxury of a forward deployed carrier in Japan eases both transit distance and presence requirements for the Indian Ocean. Since the early 1970's, the U.S. has kept a carrier and a variety of other combatants home ported in Yokosuka, Japan. This arrangement has been beneficial for both nations. For the U.S., forward presence and alliance relations are satisfied through the arrangement while the Japanese pay for 50 percent of the carrier's ship repair work in port as of 1992 and will increase payments to 100 percent by 1995.⁷⁶ Japan benefits through lower defense requirements and an enhanced sense of security over her surrounding Asian neighbors who have traditionally not been trusted by the Japanese. In 1991, the *Independence* replaced the *Midway* as the Japan-based carrier. A conventional carrier whose service life extension was completed in 1988, the *Independence* was a logical choice for Japanese duty. It is expected the *Independence* will stay in Japan until at least 1997 when it is scheduled to be decommissioned. Its likely replacement would be the *Constellation*, another conventionally-powered carrier that is currently under rework for service life extension in Philadelphia. Although basing a nuclear carrier in Japan would enhance U.S. carrier capabilities overseas, such a move would probably be met with extreme opposition by the Japanese public and government. For this reason, keeping one active conventional carrier, other than the training carrier, in the U.S. inventory is logical as long as the option of forward basing in Japan remains.

⁷⁶ Telephone conversation with Captain Jim Giblyn, National War College, Washington DC, 20 January 1992.

Included in the 1993 Presidential budget was the lead money for beginning construction on the ninth *Nimitz*-class carrier (CVN-76) which will be built in Newport News Shipyard by the Tenneco Corporation. Although not yet approved by Congress, construction on the new carrier is scheduled to begin in 1995. CVN-76 would inevitably replace an aging conventional ship and is in fact needed if a dozen carriers are to constitute the force for the future. Proponents of CVN-76 argue that the industrial base must be maintained so that skilled labor is not needlessly lost if the nation is eventually required to build carriers in the distant future. The same argument could apply to the construction of nuclear submarines, yet the *Seawolf* attack submarine may be cancelled after the first vessel is launched, costing many technically skilled laborers their jobs. Too many technical projects have been terminated within the DoD to cite the issue of saving the industrial base as a reason for building another carrier. The underlying reason for building CVN-76 should be to replace an older conventional carrier so that long-term costs are held down while maintaining a smaller, more efficient carrier force. Since the *Nimitz*-class carrier and her sister ships require refueling at the turn of the century, the idea that work will not exist is an incorrect assessment. The fact of the matter is that funds are more sorely needed for aircraft than the maintenance of the carrier industrial base for the purpose of employment. The need for more carriers after CVN-76 will simply not arise for some years.

A smaller, more affordable carrier force structure centered around one efficient class of carrier whose costs will be minimized is logical if the Navy must operate in a fiscally constrained environment in the future. With nine nuclear carriers that are of the *Nimitz*-class configuration, standardized training, operations, and minimized repair and maintenance costs could be

realized. Working with ten total carriers (one conventional ship in Japan), the Navy will have the capability to meet a regional contingency, as it did in the Gulf War with six carriers, and still have excess carriers to meet a second crisis or maintain commitments both before and after a conflict. It must be realized that carriers are not the main issue, the main issue is whether the Navy can field enough modern, capable aircraft to place on both existing and future carriers for the welfare of the Navy at large.

CHAPTER VIII

CONCLUSION

The current dilemma the United States faces in funding a strong Navy in 1992 is reminiscent of Great Britain's position in 1815. For the majority of the 19th century, Great Britain was the world's only superpower. Britain had global interests along with the ability to project her power on a worldwide basis. Having just completed and won a war against the world's largest continental power, France, the British electorate was unwilling to continue high level defense spending after the lengthy, expensive struggle to defeat Napoleon. The British were thrust into the position as the dominant power attempting to maintain peace. Furthermore, the British people expected their homeland to be protected along with their vast colonial possessions. How, then, did the British accomplish these security objectives and stabilize the world economic system?

First, the British maintained their technological edge. They fostered a strong foundation for research and development that produced great breakthroughs in metallurgy and propulsion. While the British were not the originators of every technological development, they were usually in a position to adapt and produce new innovations much more efficiently than rival nations. Second, the British maintained a strong defense industrial base in order to capably and rapidly rebuild their naval power. Third, the British continually maintained a fleet that was vastly *superior* in design to any of its potential adversaries. Finally, British seamanship skills and levels of readiness whether under sail or steam were unparalleled in comparison to

the fleets of other countries.⁷⁷ For numerous decades no other nation on earth was in a position to challenge England's fleet.

Nearly two hundred years later, after soundly defeating Iraq's military and winning the expensive, lengthy Cold War struggle with another continental power, the Soviet Union, the United States finds itself in a position much like the British. With global economic commitments, an industrial base capable of producing the most advanced military equipment, and the world's most powerful military, the U.S. too, is in a position to reassess its role as the dominant world superpower. Likewise, the U.S. Navy must reevaluate its role in national defense. The U.S. has already taken two critical steps that many world powers have been reluctant to embark upon; first, building and maintaining a powerful navy, and second the resolve to actually use naval force in pursuit of national objectives.⁷⁸ The Navy must recognize and treat the changed budget climate along with evolving regional threats as catalysts for transformation rather than impediments to progress. Lingering adherence to a large former force structure for "tradition's sake" will undoubtedly weaken the Navy and jeopardize national security.

With the last 45 years as a reference, the Navy has yet to commit more than 6 carriers to a major conflict simultaneously. Although protracted conflicts such as Vietnam and Korea both employed the likes of 15 to 17 different carriers respectively, and Desert Shield/Storm involved 9 individual carriers, the need for 12 or more carriers is currently being driven by the Navy's commitment to fulfill the role of forward-deployment as opposed to calculating how many carriers are required to combat future

⁷⁷ Paul M. Kennedy, The Rise and Fall of the Great Powers, (New York: Random House, 1987) pp. 73-170.

⁷⁸ Cable, p. 26.

regional threats. In other words, the current force structure is no longer threat-oriented as it was in the past. During the era of Navy Secretary John Lehman, the need for building additional carriers was justified through the existence of a strong Soviet maritime threat. In the absence of another naval rival, the Navy has been forced to "hang its hat" on forward presence/crisis response for force level justification. As a result, the Navy is correct in its assessment of not having enough carriers to fulfill a constant three ocean forward presence mission since to do so requires roughly 15 carriers. Yet on the other hand, it appears to have an excess of carriers if a regional conflict requires no more than the simultaneous use of 6 or fewer carriers (taking into account some level of commitment preceding and following a conflict). Although forward presence is one of the goals of the national strategy, the Navy and the service Commander-in-Chiefs (the CINCs) have yet to make the realization there is not a hard requirement for aircraft carriers to accomplish the brunt of this mission. Nowhere is there a written requirement for the Navy to maintain a certain number of carriers in a specific number of oceans. Much of the ongoing commitment for aircraft carriers stems from obligations generated through traditional methods of conducting forward presence. In reality, the Navy could fulfill its role of forward presence/crisis response by deploying an assortment of naval combatants arranged a variety of ways, to various worldwide regions of concern.

Discounting historical precedent and the lack of a significant naval threat, the Navy is currently not in a position to fund a large fleet for fulfilling the role of forward presence. Although the Navy is attempting to fund 12 deployable carriers to the best of its ability, the harsh reality of the situation is that the Navy is a service of diverse specialties, each facing fiscal

demands similar to Naval Aviation. From an economic standpoint, 12 carriers with 11 modern, well armed air wings are affordable only if sacrifices are made Navy-wide or the funding for the Navy's share of the defense budget is larger than the other services. Assuming the Navy maintains roughly one-third of the DoD budget and a budget in the vicinity of \$75 to \$85 billion per year in future years, the maintenance of a 12 carrier/11 active air wing complement will become stagnant in the face of inflation and modernization. If a realistic requirement for forward-deployment could be justified along with an increased regional threat, fiscal relief might be forthcoming to finance 12 carriers and continue the much-needed aircraft modernization and procurement. This, however, is simply not the case in light of changes that have occurred on both the domestic and international fronts.

The Navy is at a critical juncture in deciding exactly what must be sacrificed in order to maintain the integrity of the institution. A passage in the *Fleet Marine Force Manual* bears resemblance to the Navy's current dilemma,

"Finally, since all decisions must be made in the face of uncertainty and since every situation is unique, there is no perfect solution to any battlefield problem. Therefore, we should not agonize over one. The essence of the problem is to select a promising course of action with an acceptable degree of risk, and to do it more quickly than our foe. In this respect, a good plan violently executed now is better than a perfect plan executed next week."⁷⁹

Resolution of the critical financial issues will undoubtedly impact both personnel and force structure. With fiscal reality rather than Naval tradition

⁷⁹ Fleet Marine Force Manual, FMFM 1, PCN 13000005000, p. 70.

as a guide, some of the critical choices the Navy *must* make to relieve current and future monetary shortfalls while preparing for a changed threat include:

- Reduce the number of deployable carriers to a maximum of 10 depending on the continued benefit and status of relations with Japan. If the cost of maintaining a carrier in Japan is not fiscally or politically feasible, the number of carriers must be reduced to the 9 nuclear *Nimitz*-class ships.
- Procure enough aircraft with the most up-to-date capabilities to fill the decks of a down-sized carrier fleet.
- Terminate the *Enterprise* refueling project.
- Cancel one of two new major aircraft programs in order for some measure of force modernization to occur.
- Shut down naval air stations consistent with requirements of fewer deploying air wings.
- Substitute other Navy assets in lieu of aircraft carriers for the mission of forward-deployment/crisis response.
- Concentrate on continuing to improve fleet training and readiness levels.
- Reduce the total number of personnel Navy-wide to a level consistent with fewer deployable ships.
- Maintain research and development efforts on the most promising ventures through to procurement.

If there is a lesson to be learned from the British of nearly 200 years ago, it should be apparent the British foundation for successful world power emanated from some of the same pillars of strategy the U.S. is striving to maintain in the post-Cold War era. For the conservation and health of its forces, Naval leadership must reassess and redirect its efforts within the new international environment, much like the British in the early 1800's. Neither the evolving threat nor the stringent budget environment are comparable to past experiences for the Navy. Maintaining global power in

pursuit of national interests will not be found through sheer numbers of naval combatants. A modern, scaled-down Navy with the greatest probability of mission success against the most formidable foe, must drive the design for carrier air power into the twenty-first century. America's security and future success will in part depend on the nation's ability to effectively project power on a worldwide basis. In a manner similar to the British, the U.S. Navy must place its energy into maintaining and nurturing a superior navy, adapting future technologies to the fleet, and sustaining a viable industrial base.

The challenges the peacetime Navy faces as it enters the twenty-first century have never been so extreme, nor has the opportunity to redefine the ways by which to accomplish the Navy's mission ever been greater. Naval leadership must seize the opportunity to set a bold new course that best preserves the unique capabilities inherent in carrier aviation. Preservation of this valuable facet of American defense is of paramount importance if the United States is to remain the world's most viable superpower.

APPENDIX I

Reproduced From Ronald O'Rourke's: "Aircraft Carrier Force Levels and Deployment Patterns: Issues and Options," CRS Report to Congress, Congressional Research Service, The Library of Congress, 91-516F Washington, DC: June 1991.

THE MATHEMATICS OF CARRIER FORWARD DEPLOYMENTS⁸⁰

In previous years, an oft-cited rule of thumb in deriving aircraft carrier force-level requirements was that to keep one carrier continuously on station in an overseas operating area, the Navy needs to have three in its inventory, the other two being in maintenance or training. This rule of thumb was derived from the fact that carriers other than those in long-duration overhaul nominally deployed overseas for 6 months and then returned to home waters for a 12-month period of repairs and training.

In the mid-1980s, as a means of limiting family separation for sailors and thereby bolstering Navy personnel retention rates, the Navy instituted three perstempo limits requiring that: (1) overseas deployments last no more than 6 months; (2) a minimum 2 days be spent in home waters for each day on overseas deployment; and (3) over a five-year period, at least 50 percent of a sailor's time be spent actually in home port. The last of these three limits caused the non-deployed period to be lengthened by 2 months, to 14.⁸¹ Thus, for carriers not in long-term overhaul, the cycle is now actually 6 months of availability for overseas deployment out of every 20.

Once every several years, however, a carrier must go into long-duration overhaul. When the length of time between this long-term overhaul work and the average duration of this work is taken into account,

⁸⁰ The following discussion is based on a briefing received from Navy officials on March 30, 1990.

⁸¹ This is because carriers not on overseas deployments nevertheless spend some of their time, nominally 29 days each quarter, at sea in local waters for normal training.

the effect is to add about another 7 months to the operating cycle.⁸² Thus, over the long term, the cycle becomes 6 months deployed out of every 27. On this basis, it takes not 3 carriers to keep one on deployment, but rather 4.5 (27 divided by 6 equals 4.5).

The 6-month deployment period, however, includes the time needed to transit to and from the operating area. When round-trip transit time is taken into account, something less than 6 months is actually spent on station in the operating area, and something more than 4.5 carriers is consequently needed to maintain one carrier continuously on station. The more distant the operating area is from the home port, the longer the round-trip transit time, and the higher the number of carriers needed to keep one on station.

U.S. Navy aircraft carriers have maximum sustained speeds in excess of 30 knots, and major U.S. Navy surface combatants generally have maximum sustained speeds of about 27 to 33 knots. But amphibious ships and underway replenishment (resupply) ships, which often are included in the battlegroup, have maximum sustained speeds more on the order of 20 to 25 knots. Steaming at high speeds, moreover, dramatically increases fuel consumption and can strain a ship's propulsion plant. And aircraft carriers conduct flight operations (steaming into the wind) frequently in a direction other than the one in which the battlegroup is generally traveling. As a consequence of all these factors, Navy carrier battlegroups typically make transits to overseas deployment areas at an average rate of advance of 14 knots.

At such speeds, the time required to transit to and from an overseas operating area can constitute a significant fraction of the 6 months available for deployment. Figure 18 shows the effect of transit distance and speed on the number of carriers required to keep one continuously on station. For an operating area in the mid-Mediterranean, a total of something more than 5 Atlantic-coast-based carriers would be needed to keep one continuously on

⁸² On average, nuclear-powered aircraft carriers (CVNs) typically operate for 7 years (84 months) between long-duration overhauls, during which four 20-month operational cycles can be accommodated. The long-duration overhauls last an average of 24 months. Thus, CVNs make an average of four 6-month deployments every 108 months, or an average over the long term of one 6-month deployment every 27 months. Conventionally powered aircraft carriers (CVs) typically operate for 5 years (60 months) between long-duration overhauls, during which three 20-month operational cycles can be accommodated. The long-duration overhauls last an average of 20 months. Thus, CVs make three 6-month deployments every 80 months, or an average over the long term of one 6-month deployment every 26 and two-thirds months.

station. For an operating area in the West Pacific, something between 5 and 6 Pacific-coast-based carriers would be needed, and for an operating area in the Arabian Sea, something approaching 7 Pacific-coast based carriers would be needed.

Given the long transit distance to the Indian Ocean region and the dearth of good repair and liberty ports there, carriers deploying there typically stop in places like Pearl harbor, Subic Bay, and Hong Kong for a total of 10 days going out, and another 10 days on the way back to the United States. Round-trip transits to the Indian Ocean, already the most time consuming, are thereby lengthened by another 20 days, further reducing time on station. When this effect is taken into account, the number of Pacific-coast-based carriers required to keep one on station continuously in the Arabian Sea increases to something more than 8.

On the other hand, the United States keeps one of its carriers-currently the *Midway* (replaced in 1991 by the *USS Independence*) forward-homeported in Yokosuka, Japan, a location that shaves thousands of miles off distances to operating areas in the Western Pacific and Indian Ocean. The *Midway* (*Independence*), moreover, does not go into long-duration overhaul, so its operational cycle is 6 months deployed out of 20 rather than 6 out of 27. And because of Yokosuka's location, this carrier can be counted as forward-deployed in the Western Pacific even when it is alongside the pier in its home port. This has the effect of radically reducing the number of carriers required to maintain one continuously on station in the Western Pacific.

Number of CVs required to keep 1 on station

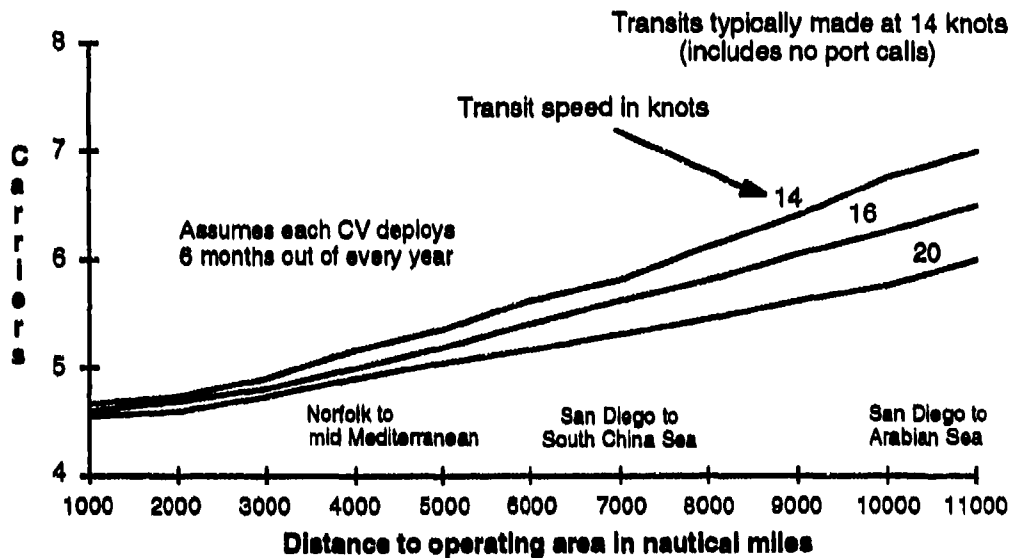


Figure 18.

Source: O'Rourke, Ronald, "Aircraft Carrier Force Levels and Development Patterns: Issues and Options," CRS Report to Congress, Congressional Research Service, The Library of Congress, 91 516F Washington, DC: June 1991, p. 6.

Taking these and other complicating factors (such as shipyard availability) into account, the Navy has testified that 5 carriers are required to keep one continuously deployed in the Mediterranean, another 1.7 carriers are required to keep one continuously deployed in the West Pacific, and another 7.6 carriers are required to keep one continuously deployed in the Indian Ocean--a total of 14.3 aircraft carriers for all three areas. Without a carrier forward-homeported in Japan, the Navy says, the total number required for these three areas would become 18. An additional continuous carrier presence in the Caribbean, the Navy says, would require more than 4 additional carriers.

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